OPERATING INSTRUCTIONS

CLV 490
Bar Code Scanner
Advanced line

SICK

Software versions

Software/Tool	Function	Version
CLV 490-0010/-0011	Firmware	From V 0.90 0000
CLV 490-1010/-1011	Firmware	From V 0.90 0000
CLV 490-6010/-6011	Firmware	From V 1.22 K609
CLV 490-7010/-7011	Firmware	From V 1.22 K609
CLV 490-2010/-2011	Firmware	From V 1.30 KA54
CLV 490-3010/-3011	Firmware	From V 1.30 KA54
CLV-Setup	User interface	From V 2.70 J645
CLV-Setup Help	Online help (HTML)	From V 1.1
I-ViewPro™	HTML browser (offline)	From V 2.38

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CLV 490 Bar Code Scanner

Quick Finder

- **What is delivered with the device**
  - *Chapter 3.1.1 Scope of delivery, Page 3-1*
- **CAUTION!**
  - *Chapter 2 Safety information, Page 2-1*
- **Mounting the device at the reading station**
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- **Connecting the device**
  - *Chapter 5 Electrical installation, Page 5-1*
- **Overview of the device and its functions**
  - *Chapter 3 Product description, Page 3-1*
  - *Chapter 6.2 Default settings, Page 6-1*
  - *Chapter 6.5 Operating modes and outputing the reading result, Page 6-19*
  - *Chapter 9 Technical data, Page 9-1*
  - *Chapter 10.3 Installing and operating the external parameter memory, Page 10-34*
- **Starting the device with the default settings**
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- **Installing the "CLV-Setup" program**
  - *Chapter 10.6 Installing and operating the "CLV-Setup" program, Page 10-41*
- **Adapting the device to the reading application**
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- **Troubleshooting**
  - *Chapter 8 Troubleshooting, Page 8-1*
- **Finding information**
  - *Table of contents, Page I-5*
  - *Index, Page 10-85*

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Installation procedure (overview)

Reading trigger via “Sensor“ switching input (default setting)

1. Check the delivery to make sure that none of the components is missing.
2. Mount the CLV at the reading station and align it with the object carrying the bar code.
3. Mount the AMV/S 60 Connection Module.
4. Connect the CLV to the AMV/S 60 Connection Module using the two cables no. 2 020 302.
   Alternatively, connect the device to the AMV/S 60 via the external parameter memory no. 2 020 307.
5. Connect the reading pulse sensor to the "Sensor" switching input in the AMV/S 60.
6. Connect the host to the host interface in the AMV/S 60.
   Adapt the AMV/S 60 to the host interface type of the CLV.
7. Switch on the power supply to the AMV/S 60.
   The "Device Ready" LED lights up after the CLV has started.

   CLV with external parameter memory connected:
   The "Device Ready" LED and the "Read Result" LEDs blink after the CLV has started. The CLV is **not** ready to start reading. See *step 11*.

   Line scanner with oscillating mirror:
   In the default setting, the CLV deflects the scan line around the position CW = 50 with a frequency of 1 Hz and an oscillating amplitude of max. ±20° (±40 CW).
8. Switch on your PC and start Windows™ (minimum requirement: Windows 95™).
9. Install the "CLV-Setup" software, online CLV-Setup Help and, if necessary, the I-ViewPro™ HTML browser from the CD on your PC.
10. Connect the PC to the terminal interface of the CLV. To do so, connect the RS 232 data connection cable (e. g. no. 2 014 054) to the "Service plug" in the AMV/S 60.
11. Start the "CLV-Setup" program.
    CLV-Setup establishes communication with the CLV and uploads the parameter set. The parameters are then displayed on the tabs.

    CLV with external parameter memory connected:
    First download the CLV parameter set to the external memory.
    Disconnect the AMV/S 60 briefly from the power supply to restart the CLV.
12. Carry out a test read using test bar codes (clock the CLV accordingly).
    Display the reading result in the Terminal Emulator window of the "CLV-Setup" program.
13. Configure the CLV for the application using the settings on the tabs in CLV-Setup.
    Copy (download) the modified parameter set to the CLV temporarily.
    Do **not** switch off the power to the AMV/S 60 (CLV)!
14. Test the application under realistic conditions.
15. Check whether the data is transmitted correctly between the CLV and host.
16. If necessary, correct and optimize the parameter values.
    Copy (download) the parameter set **permanently** to the CLV.

    CLV with external parameter memory connected:
    Copy the modified parameter set to the external parameter memory.
17. Save the parameter set as a configuration file "*.scl" in the "CLV-Setup" program.

The CLV can then be operated with the **application-specific** settings.

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Abbreviations

AMV/S Connection Module with signal distribution/with additional power supply pack

BMV/S Bus Connection module with signal distribution/with additional power supply

CAN **C**ontroller **A**rea **N**etwork (standard field bus system with message-orientated data exchange protocol)

CLV **C**ode-**L**eser **V**-Prinzip.
The CLV 490 bar code scanners are abbreviated to "CLV" in this documentation, exept where a distinction is necessary

DC **D**istance **C**onfiguration

DOF **D**epth **O**f **F**ield

EEPROM **E**lectrically **E**rasable **P**rogrammable **R**ead **O**nly **M**emory

HD **H**igh **D**ensity

HTML **H**yper **T**ext **M**arkup **L**anguage (page-description language on the internet)

LED **L**ight **E**mitting **D**iode

PLC **P**rogrammable **L**ogic **C**ontroller

RAM **R**amdom **A**cces **M**emory

ROM **R**ead **O**nly **M**emory

RTF **R**ich **T**ext **F**ormat (standard document format with format descriptions)

SMART **S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology

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1 Notes on this document

1.1 Purpose

This document is a guide to the operation of the barcode scanner

- CLV 490 with auto-focus

in the following variations:

- Line scanner
  - CLV 490-2010, resolution from 0.20 mm (high density)
  - CLV 490-2011, resolution from 0.20 mm (high density), with heater
  - CLV 490-0010, resolution from 0.30 mm (standard density)
  - CLV 490-0011, resolution from 0.30 mm (standard density), with heater
  - CLV 490-6010, resolution from 0.40 mm (low density)
  - CLV 490-6011, resolution from 0.40 mm (low density), with heater
- Line scanner with oscillating mirror
  - CLV 490-3010, resolution from 0.20 mm (high density)
  - CLV 490-3011, resolution from 0.20 mm (high density), with heater
  - CLV 490-1010, resolution from 0.30 mm (standard density)
  - CLV 490-1011, resolution from 0.30 mm (standard density), with heater
  - CLV 490-7010, resolution from 0.40 mm (low density)
  - CLV 490-7011, resolution from 0.40 mm (low density), with heater

This document provides information on

- Mounting and connecting the device
- Startup
- Operating and configuring (parametrizing) the device
- Maintenance
- Exchanging the device without losing the parameter set
- Special applications and procedures

The bar code scanner with all its variants will in this manual be referred to as the "CLV", except where a distinction is necessary.

1.2 Target audience

This document is intended for persons who are responsible for the following activities:

1.2.1 Mounting, electrical installation, maintenance and replacement

Electricians and service technicians.

1.2.2 Startup, operation and configuration

Technicians and engineers.

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1.3 Information content

This document contains all the information required to mount, install, and start up the CLV with the **factory settings**.
A series of step-by-step instructions is provided for each of these activities.

Configuration of the CLV for **the application-specific reading situations** is carried out with the Windows-oriented PC software "CLV-Setup". Further assistance is also available in the form of the online help system CLV-Setup Help. The procedure for installing and operating the software is described in the appendix.

For further information on the design of the bar code scanner or on bar code technology in general, please contact the Division Auto Ident at SICK AG.

1.4 Symbols

Some of the information in this document is marked specially so that you can access it quickly:

Warning!
Warnings are provided to prevent injury to operating personal or serious damage to the bar code scanners.

➢ Always read warnings carefully and observe them at all times.

Note Indicates special features or characteristics.

Explanation Explanations provide background information on technical features.

Recommendation Recommendations help you carry out certain procedures more effectively.

Tip Tips explain settings in the user interface of the "CLV-Setup" program.

Default Marks a section containing the factory defaults.

SCANNING FREQUENCY This typeface is used to refer to a term in the "CLV-Setup" program.

Icons refer to buttons in the "CLV-Setup" program.

"Host receive fault" This typeface is used for messages output via the terminal interface of the CLV.

This symbol is used to mark sections that describe steps carried out with the "CLV-Setup" program.

This symbol refers to additional technical documentation.

➢ Here you have to do something. This symbol characterizes single-step operating instructions. Multiple-step operating instructions are characterized by sequential numbers.

⇨ Here you select a function of the "CLV-Setup" user interface.

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2 Safety information

2.1 Authorized users

For the CLV to function correctly and safely, it must be mounted and operated by sufficiently qualified personnel.

The following qualifications are required for the various tasks involved:

2.1.1 Mounting and maintenance

- General technical training
- Knowledge of the standard guidelines relating to safety at the workplace

2.1.2 Electrical installation and replacement

- Practical training in electrical engineering
- Knowledge of the standard safety guidelines relating to electrical engineering
- Experience operating the devices in the relevant application (e. g. conveyor belt)

2.1.3 Startup, operation and configuration

- Experience operating the devices in the relevant application (e. g. conveyor belt)
- Knowledge of the hardware and software environment of the relevant application (e. g. conveyor belt)
- Basic understanding of Windows 95™/98™, Windows NT™ or Windows XP™
- Ability to use an HTML browser (e. g. Netscape Navigator™)
- Basic understanding of data transfer methods
- Basic understanding of bar code technology

2.2 Intended use

The CLV is designed to detect and decode bar codes automatically. It is mounted in a reading station and reads bar codes on objects positioned on a conveyor belt, for example. The CLV transfers the data content of the decoded bar codes via its host interface to a host for further processing.

Any warranty claims vis-à-vis SICK AG will be rendered invalid if the device is used for any other purpose or if changes are made to the device, also as part of the mounting and electrical installation procedures.

2.3 General safety instructions and protection measures

➢ Always read the general safety instructions carefully and observe them at all times. Please also observe the warnings in front of the operating instructions in each chapter of this document.

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Shock hazard!

Depending on the type of device, the AM**S** 60 Connection Module (accessory) for the CLV is connected to a mains voltage of 230 V AC 50 Hz or 115 V AC 50/60 Hz.

➢ When working with electrical equipment, always follow the relevant safety specifications.

Laser beam can cause blindness!

The CLV uses a class 2 red-light laser. Looking directly at the laser beam can seriously damage your eyesight.

➢ Never look directly into the path of the beam (similar to sunlight).

➢ Do not direct the laser beam at other persons.

➢ When mounting and aligning the CLV, avoid reflections caused by reflective surfaces.

➢ Do not open the housing.
(Opening the housing does not deactivate the laser diode.)

➢ Observe the most recent laser specifications (DIN EN 60825-1, latest version).

Laser power

The laser operates at a wave length of $\lambda = 650$ nm (visible red light). The power output at the reading window is max. 2.8 mW.
The emitted radiation is not dangerous to human skin.

Laser warnings

The laser warning symbols applicable for Europe (*Fig. 2-1*) can be found on the CLV at the following locations:

- The laser warning symbol on line scanners is positioned beside the reading window on the front side of the device. The GB/US laser warning is located on the side containing the electrical connections (see *Fig. 3-1, Page 3-4*.)
- The laser warning symbol on line scanners with oscillating mirror is located above the reading window, on the cover of the mirror. The GB/US laser warning is located on the side containing the electrical connections.

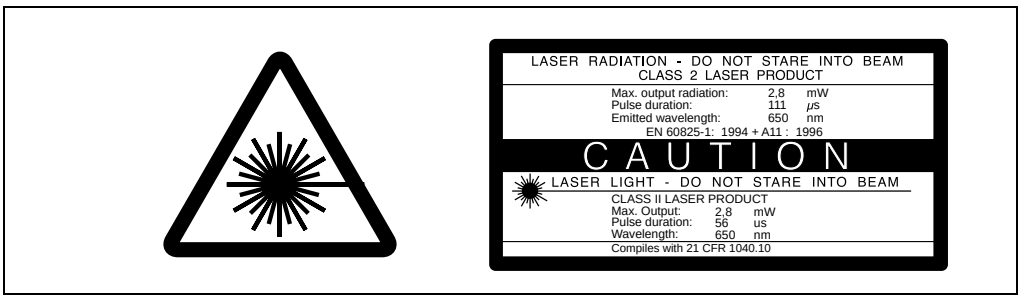
LASER RADIATION - DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
Max. output radiation: 2,8 mW
Pulse duration: 111 µs
Emitted wavelength: 650 nm
EN 60825-1: 1994 + A11 : 1996
CAUTION
LASER LIGHT - DO NOT STARE INTO BEAM
CLASS II LASER PRODUCT
Max. Output: 2,8 mW
Pulse duration: 56 us
Wavelength: 650 nm
Compiles with 21 CFR 1040.10

Fig. 2-1: Laser warning labels on the CLV (applicable for Europe)

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Note A set of laser warnings in German/US English and French/US English is included in the delivery scope. The GB English/US English warnings can be pasted over with these if necessary.

If the CLV is installed in a machine/panel with the result that the laser warning labels are no longer visible, additional warnings (not included in the scope of delivery) must be provided on the machine beside the emergence aperture of the laser beam.

Internal protective circuits

The CLV is equipped with monitoring circuits that deactivate the laser diode in the event of a malfunction.

Activation and deactivation of the laser diode is controlled by the reading pulse trigger.

A timer (laser timeout) automatically deactivates the laser diode in Reading mode ("Sensor input" and "Serial interface" trigger mode) if the reading interval has not ended after 10 minutes (default setting). However, it does not end the reading interval. In this case, the CLV outputs the message:

"Laser safety timeout"

on the terminal interface. The reading interval must be terminated by resetting the trigger signal. The laser diode is activated again by the next reading trigger.

In the Percentage Evaluation mode, Adjusting mode and Show CP-limits as well as in the Free-running Reading mode the laser diode is constantly activated.

Note In the Reading mode, the CLV carries out a distance measurement referencing at regular intervals. During referencing, it turns the laser diode on for a maximum of 10 seconds.

2.4 Quick stop and quick restart

2.4.1 Stopping the CLV

➢ Switch off the power supply.

This can result in loss of the following (at the most):

- The application-specific parameter set, if it was stored **temporarily** in the CLV
- The last reading result
- Daily operating data
  (operating hours counter, number of reading intervals, Good Read count, maximum duration trigger, minimum duration trigger, average identification quality)

2.4.2 Restarting the CLV

➢ Switch on the power supply.
The CLV resumes operation with the parameter set that was **last stored permanently** and reset the daily operating data.

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2.5 Environmental information

The CLV is designed to cause minimum impact on the environment. It does not contain any silicone-based materials and, therefore, does not represent any problems for paint sprayers in paint shops, for example.

2.5.1 Power requirements

The power requirements depend on the variants:

- The line scanner has a typical power consumption of 9 W and max. 16 W
- The line scanner with oscillating mirror has a typical power consumption of 9 W and max. 18 W
- The line scanner equipped with an integrated heater has a typical power consumption of 75 W and max. 90 W
- The line scanner with oscillating mirror equipped with an integrated heater has a typical power consumption of 75 W and max. 100 W

The values are given for devices with disconnected switching outputs.

2.5.2 Disposal after removal from service

Always dispose irreparable devices in a manner that is not harmful to the environment and in accordance with the applicable national waste disposal regulations. The CLV can be separated into recyclable secondary raw materials and special-category waste (electronic scrap).

See also *Chapter 7.3 Disposal, Page 7-2*.

SICK AG currently does not accept delivery of unusable or irreparable devices.

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3 Product description

3.1 Design

3.1.1 Scope of delivery

The CLV is supplied with the following in the **packing**:

- An information sheet (notes on device) with terminal diagram and Quick Start instructions
- An additional set of Class 2 laser warning labels (self-adhesive) in German/US English and French/US English

Depending on **the number of devices ordered**, one or more **sets of technical documentation** comprising:

- These CLV 490 Operating Instructions in English and German
- A CD-ROM containing the "CLV-Setup" program for Windows™, the CLV-Setup Help online help system, and the I-ViewPro™ HTML browser

Chapter 10.13 Accessories, Page 10-71 contains an overview of the available accessories, connection modules, cables, and connectors, as well as sensors for generating the reading pulse.

3.1.2 Variants

The CLV is currently available in the following variants:

	Type (red light)	Part. no.	Scanning method	Resolution	Reading window	Heater
High density	CLV 490-2010	1 019 311	Line scanner	From 0.2 mm	End	No
	CLV 490-3010	1 019 313	Line scanner with oscillating mirror	From 0.2 mm	Side	No
	CLV 490-2011	1 019 312	Line scanner	From 0.2 mm	End	Yes
	CLV 490-3011	1 019 314	Line scanner with oscillating mirror	From 0.2 mm	Side	Yes
Standard	CLV 490-0010	1 016 958	Line scanner	From 0.3 mm	End	No
	CLV 490-1010	1 016 959	Line scanner with oscillating mirror	From 0.3 mm	Side	Yo
	CLV 490-0011	1 016 960	Line scanner	From 0,3 mm	End	Yes
	CLV 490-1011	1 016 961	Line scanner with oscillating mirror	From 0.3 mm	Side	Yes
Low density	CLV 490-6010	1 018 872	Line scanner	From 0.4 mm	End	No
	CLV 490-7010	1 019 094	Line scanner with oscillating mirror	From 0.4 mm	Side	No
	CLV 490-6011	1 019 095	Line scanner	From 0.4 mm	End	Yes
	CLV 490-7011	1 019 096	Line scanner with oscillating mirror	From 0.4 mm	Side	Yes

Table 3-1: CLV variants

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3.1.3 System requirements

CLV without heater

The following are required to start up and operate the CLV without heater:

1. A SICK Connection Module to provide the power supply and connect the data and function interfaces.

   Available types:

   – For connecting **one** CLV:
   AMV 60-011 (no. 1 017 134) for 18 ... 30 V DC, enclosure rating max. IP 54
   AMS 60-013 (no. 1 017 139) for 230 V AC 50 Hz/24 V DC,
   enclosure rating max. IP 54
   AMS 60-012 (no. 1 017 140) for 115 V AC 50/60 Hz/24 V DC,
   enclosure rating max. IP 54
   AMS 100-011 (no. 6 021 105) for 18 ... 30 V DC, enclosure rating max. IP 65

   – For connecting **two** CLVs:
   AMV 30-071 (no. 1 017 391) for 18 ... 30 V DC, enclosure rating max. IP 54
   AMV 200-011 (no. 6 021 106) for 18 ... 30 V DC, enclosure rating max. IP 65

– or –

   Alternatively, a non-SICK Power pack with a voltage output of 18 ... 30 V DC pursuant to IEC 742 (functional extra-low voltage) and a minimum power output of **20 W**.

   Cable no. 2 020 264 (3 m) with 15-pin D Sub HD connector and one open end for connecting the CLV to the non-SICK Power pack (supply voltage).

2. The following operating voltages/power output values:
   – AMV 60-011: 18 ... 30 V DC (to IEC 742), min. 20 W
   – AMV 30-071: 18 ... 30 V DC (to IEC 742), min. 40 W
   – AMV 100-011: 18 ... 30 V DC (to IEC 742), min. 20 W
   – AMV 200-011: 18 ... 30 V DC (to IEC 742), min. 40 W
   – AMS 60-013: 230 V AC ±10 % 50 Hz
   – AMS 60-012: 115 V AC ±10 % 50/60 Hz
3. Fitting cables see *Chapter 5.2.2 Prefabricated cables (overview), Page 5-2*.
4. With external clock pulse supply via the "Sensor" switching input: a suitable reading pulse sensor for signaling an object with a bar code, e.g. a photoelectric reflex switch.
5. With object distance detection via the "IN 0 ... IN 4" switching inputs: suitable sensors for multi-stage dynamic focus control, e. g. photoelectric reflex switches.
6. A PC (min. 80486, 66 MHz, 16 MB RAM, CD drive, a serial port (COM x), mouse (recommended)) with Windows 95™/98™, Windows NT™ or Windows XP™.
7. An RS 232 data connection cable with two 9-pin D Sub sockets for connecting the PC to the terminal interface of the CLV in the Connection Module, e. g. no. 2 014 054. Pin 2 (RxD) and Pin 3 (TxD) are crossed.
8. An HTML browser, e. g. Netscape Navigator™, or the I-ViewPro™ browser supplied with the device (see *Chapter 3.1.1 Scope of delivery, Page 3-1*) for using the online help system CLV-Setup Help.
9. The appropriate bus connection module BMV/BMH 10 (available on request) for connecting the CLV to the Interbus-S, Profibus DP, the Device Net or to Ethernet.
10. For connection of the CLV to the CAN Scanner Network: the Operating Instructions "*Application of the CAN interface*" (no. 8 009 180, English edition).

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CLV with heater

The following are required to start up and operate the CLV with heater:

1. A SICK Connection Module from the **AMV 100** or **AMV 200** series to provide the power supply and connect the data and function interfaces.

   Available types:

   – For connecting one CLV: AMV 100-011 (no. 6 021 105) for 24 V DC, max. IP 65
   – For connecting two CLVs: AMV 200-011 (no. 6 021 106) for 24 V DC, max. IP 65

   – or –

   Alternatively, a non-SICK Power pack with a voltage output of 24 V DC +20 %/–10 % to IEC 742 (functional extra-low voltage) and a minimum power output of **100 W**.

   Cable no. 2 020 264 (3 m) with 15-pin D Sub HD connector and one open end for connecting the CLV to the non-SICK Power pack (supply voltage).
2. The following operating voltages/power output values:
   – AMV 100-011: 24 V DC +20 %/–10 % (pursuant to IEC 742), min. 100 W
   – AMV 200-011: 24 V DC +20 %/–10 % (pursuant to IEC 742), min. 200 W
3. See *pos. 3* under CLV **without** heater

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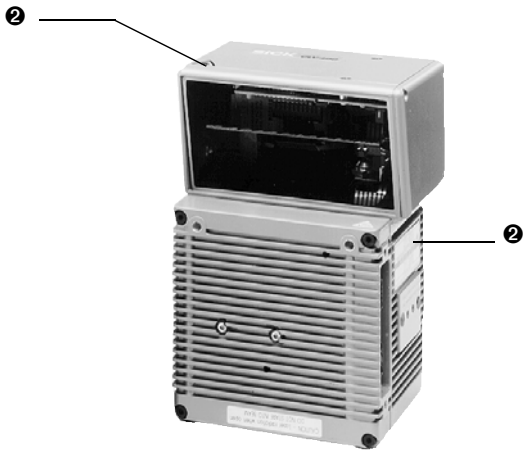
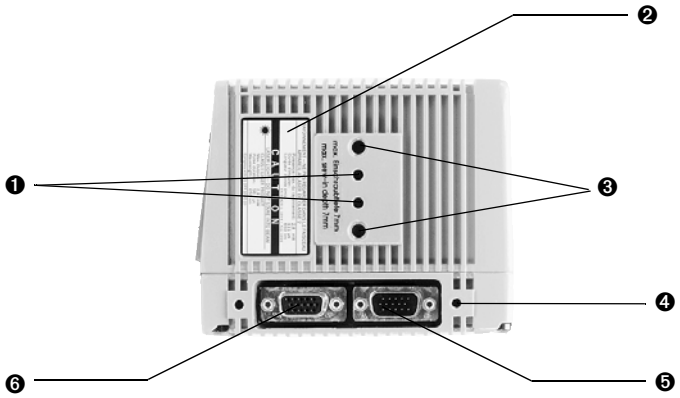
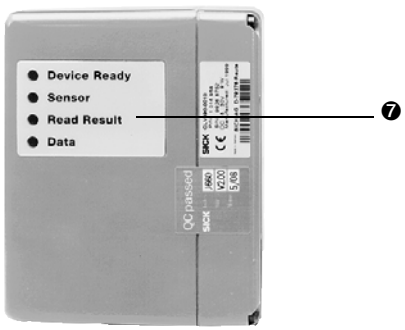
3.1.4 Design

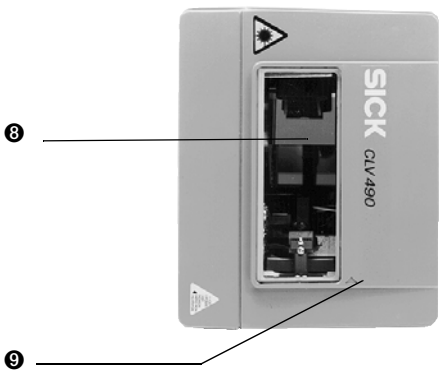
Line scanner
(front-end reading window)



Line scanner with oscillating mirror
(side reading window)







Legend

❶ Drilled hole, Ø 3.6 mm, 6 mm deep

❷ Laser warning labels

❸ Blind hole thread M 6, 7 mm deep, for securing the device

❹ Blind hole thread M 4, 10 mm deep, for the connector cover

❺ "Host/Term" connector 15-pin D Sub HD plug

❻ "I/O" connector, 15-pin D Sub HD socket

❼ LEDs (status indicators)

❽ Reading window

❾ Mark for count direction of the code position (deflection direction of the laser beam)

Fig. 3-1: Design of the CLV 490

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3.2 Method of operation

The CLV first scans the bar code with a scan line and then decodes it. The data is forwarded via the main data interface (serial host interface) to a host/PC for further processing. An overview of the CLV functions is provided in *Fig. 3-2*.

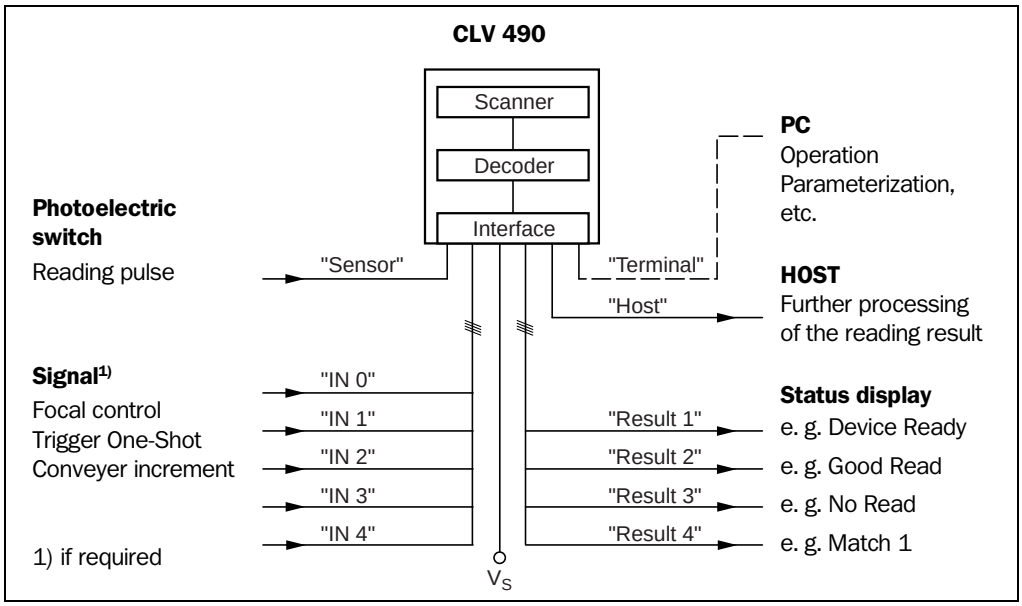

Fig. 3-2: Block diagram: CLV functions

The CLV is equipped with two decoders:

- The SMART decoder (**S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology) for decoding bar codes with small code height, bar codes that are dirty or damaged, as well as bar codes that are tilted excessively (azimuth angle)
- The tried-and-tested standard decoder of the CLV series

The CLV derives useful diagnosis data from the reading process and can transfer it to also the host. It also records operating data that can be interrogated at any time. The quality of the read can be checked in percentage evaluation mode.

To start the reading process when an object is located in the reading field, the CLV requires a suitable trigger. This opens an internal time window ("reading interval") in the CLV. In the default configuration, this trigger is supplied by an external reading pulse sensor. Alternative trigger sources include Free-running mode or a command via the host interface (for more complex applications: OTC trigger).

The current operating status is indicated by four LEDs.

If the trigger is supplied externally, the "Sensor" switching input instructs the CLV to start the reading process. The five "IN 0 ... IN 4" switching inputs switch the focus position in response to certain events, as an alternative to the autofocus function. The "IN 3" and "IN 4" inputs can also be assigned special functions. The four "Result 1 ... Result 4" switching outputs can be assigned to different functions for displaying the result status and also control external devices, such as a PLC.

The CLV is operated and configured via the auxiliary interface (serial terminal interface) using the "CLV-Setup" software or via the host interface/terminal interface using command strings.

System, warning, and error messages help you to configure the device and to locate the source of errors during startup and reading mode.

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3.2.1 Autofocus function

The autofocus function enables the CLV to detect the distance of an object during the reading process, without the need for external sensors, and then adjusts the focus position automatically to the reading plane of the bar code. In order to do so, the CLV measures the object distance each time in its reading field in front of the reading window and internally creates a distance profile. Following this, it positions the focus on the object.

3 operating modes are provided for various applications:

- *Minimum distance:* the CLV focuses on the minimum distance in the distance profile and ignores the background in the reading field. Application: with unobstructed view of the object without any surrounding objects protruding into the reading plane. One object with bar code(s) only is inside the reading field during one reading pulse.
- *Differential background:* the distance profile of the reading field background is programmed (teach-in) in the CLV without any objects present. During the reading process, the CLV then focuses on the object which it recognizes by comparing it to the distance profile of the background. Application: with unobstructed view of the object restricted by other objects that protrude into the reading plane. One object with barcode(s) only is inside the reading field during one reading pulse.
- *Differential background and tracking:* if several objects with different distances are positioned in the reading field at the same time (distance conflict), the CLV focuses on the object that is nearest to but has not exceed its internal focus switchover point. Application: in OTS operation (applications with tracking by the Omni Tracking Controller OTC 400).

The distance profile of the background can also be displayed in the "CLV-Setup" program. The reading field is defined by the autofocus range, the aperture angle, and (in the case of line scanners with oscillating mirror) also by the angle of deflection. The park setting of the focus position, from which the device focuses for each read, can be specified in addition to a time and/or position-related delay (timeout or hysteresis). If necessary, an offset can be defined for the focus position to be set by the measurement. The depth of field, which radiates in the direction of the scan lines and is caused by the V-principle of the beam deflection, is optimized as a result (*Fig. 3-3*).

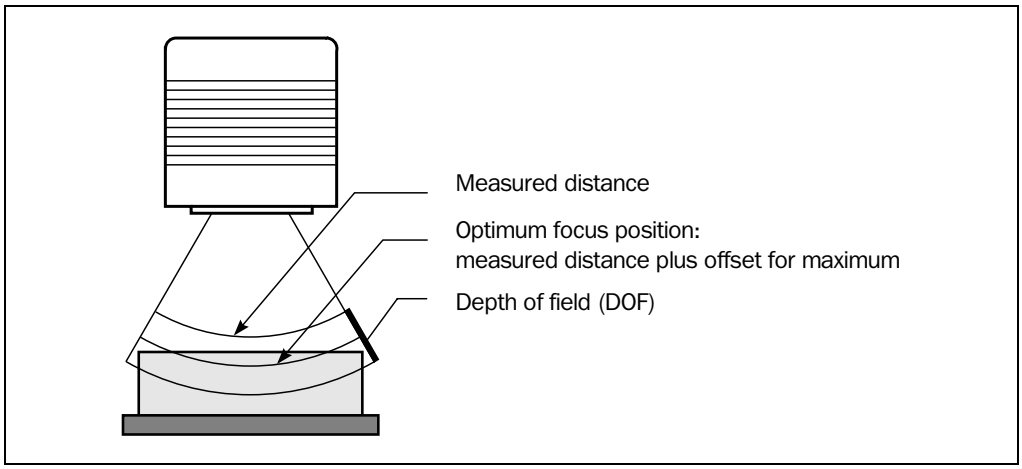

Fig. 3-3: Optimization of the depth of field for the object

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3.2.2 Event-controlled dynamic focus control

As an alternative to the autofocus function, the CLV can switch its focus position in response to certain events and thus dynamically cover a large reading range. A maximum of eight reading ranges can be defined as distance configurations for this purpose and approached consecutively in reading mode (see *Fig. 3-4*).

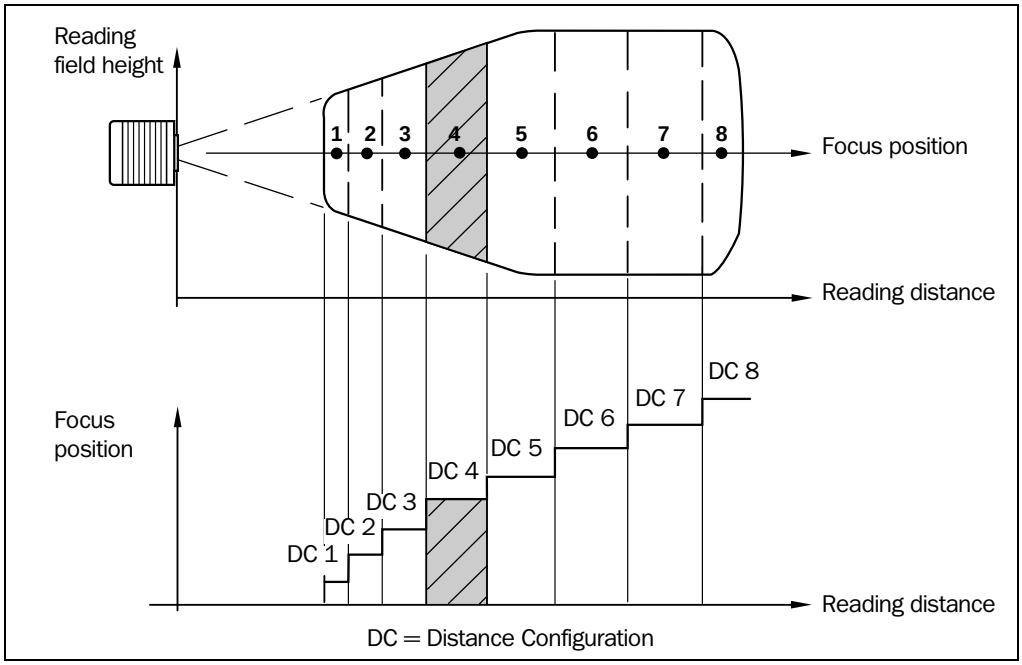

Fig. 3-4: Dynamic focus control: classification of the reading range in distance configurations

The switch over takes place in response to changes in the object distance (with reads from above: object height detection). The trigger source for the switchover is a signal combination at the "IN 0 ... IN 4" switching inputs, a command on the host interface/terminal interface or the integrated timer (e. g. for search mode). Additional in the case of the line scanner with oscillating mirror also the oscillating mirror reversal points. The distance configurations are assigned to the switchover sequence by means of a programmable assignment table. The distance measurement of the autofocus function can be additionally used to define the distance configurations.

3.2.3 Scan procedure variants

Line scanner (standard device)

Generates a scan line; due to the V-principle of the beam generation, the reading field height (the useful length of the scan line for evaluation purposes) is dependent on the reading distance.

Line scanner with oscillating mirror

The oscillating mirror also deflects the scan line perpendicularly to the scan direction at both sides around the neutral position with a low oscillating frequency. As a result, the CLV can also scan larger areas for bar codes. Due to the V-principle of beam generation, the reading field height is dependent on the reading distance.

In addition to parking (fixed position) and simple deflection with maximum amplitude, optimized oscillating mirror functions are also available:

- Oscillating with variable deflection amplitude per distance configuration
- One-Shot: one-off, defined deflection per reading pulse (forward and return phase)

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3.2.4 Additional components

Heater

The CLV can be permanently equipped with a heater for applications involving temperatures up to max. –35 °C (e. g. in a freezer).

The design, technical data, and power-up behavior of the CLV are described in *Chapter 10.4 Optional heating, Page 10-38*.

External parameter memory

The external parameter memory is located in a connector cover which, when mounted, covers the two electrical terminals on the CLV (IP 65). The parameter memory saves you time when a CLV is replaced locally by providing a copy of the current parameter set. In other words, you do not have to configure the new device.

For information on applications and operating procedures, see *Chapter 10.3 Installing and operating the external parameter memory, Page 10-34*.

3.3 Indicators and control elements

3.3.1 Control elements

The CLV is operated and configured via the terminal interface (auxiliary interface) using the "CLV-Setup" program or using command strings sent via the host interface/terminal interface. A variety of parameter options allow you to adapt the device to a wide range of applications.

The following can be defined:

- The configuration of the code types
- The read, evaluation, and output properties
- The communication parameters of the host interface
- The structure of the data output string for "Good Read" and "No Read" on the host interface
- The function of the terminal interface

Chapter 10.6 Installing and operating the "CLV-Setup" program, Page 10-41 describes the procedure for installing the "CLV-Setup" program and explains how to use it. The parameterization (configuration) procedure is explained in *Chapter 6.4 Configuring (parameterization) the CLV, Page 6-5*.

3.3.2 Function of the LEDs

Four LEDs indicate the operating status, activity of the laser diode, reading result status, and data transfer on the host interface. The LEDs are located on the rear of the device (*Fig. 3-5*).

If the optional external parameter memory is connected, the LEDs also indicate whether the memory was successfully accessed.

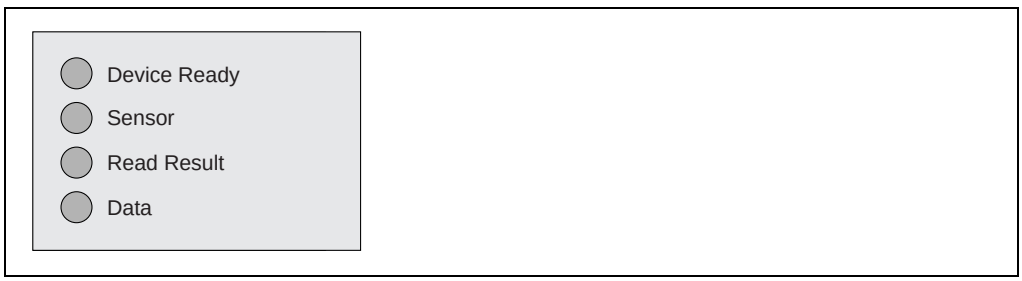

Fig. 3-5: LEDs

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The meaning of the LEDs in the various operating modes/functions is shown in *Table 3-2* and *Table 3-3*.

CLV without external parameter memory

Operating mode	LED	Display	Function
Start	**Device Ready**	*Green*	• Lights up after power-up if the self-test was successful Subsequent behavior depends on selected start option **Start option: START WITH EXTERNAL PARAMETERS (DEFAULT)** • Lights up constantly (CLV has loaded internal parameter set) **Start option: START WITH INTERNAL PARAMETERS:** • Lights up constantly (CLV has loaded internal parameter set) **Start option: START WITH COPY INTERN -> EXTERN:** • Blinks constantly together with the "Read Result" LED[1)] (CLV has loaded internal parameter set)
	Read Result	*Green*	**Start option: START WITH COPY INTERN -> EXTERN:** • Blinks constantly together with the "Device Ready" LED[1)]
Reading mode	**Device Ready**	*Green*	• Lights up constantly • Extinguishes with new operating mode/function
	Sensor	*Green*	• Lights up if reading diode is active (The laser diode is activated/deactivated by reading pulse) • Lights up constantly in Free-running mode, since laser diode is always active
	Read Result	Green	LED is linked to the "Result 2" switching output and indicates the selected result status for the defined pulse duration of the output. • Lights up after a successful read (default: Good Read) • Lights up if the match code comparison is active, the bar code read matches the specified match code(s) and the corresponding result status output is selected for the "Result 2" output
	Data	Yellow	• Flickers when the CLV transfers data to the host on the host interface
Percentage evaluation	**Sensor**	*Green*	• Lights up constantly, as Free-running mode is active
	Read Result	*Green*	Behavior depends on the reading quality: • Extinguishes if reading rate < 30 % • Blinks twice a second if reading rate 30 % ... 70 % • Blinks five times a second if reading rate 70 % ... 90 % • Lights up constantly if reading rate > 90 %
Adjusting mode	**Sensor**	*Green*	• Lights up constantly, as Free-running mode is active
Show CP-limits	**Sensor**	*Green*	• Blinks bright/dark alternately, in the frequency with which the scan line is (partially) masked out
1) Set the start option to START WITH THE INTERNAL PARAMETERS on the DEVICE CONFIGURATION tab in the "CLV-Setup" program. Download to CLV!			

Table 3-2: Meaning of LEDs: CLV without external parameter memory

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CLV with external parameter memory connected

Operating mode	LED	Display	Function
Start	**Device Ready**	*Green*	• Lights up after power-up if the self-test was successful Subsequent behavior depends on selected start option: **Start option: START WITH EXTERNAL PARAMETERS (default):** • **Blinks for approx. 10 s before lighting up constantly** (CLV has loaded the parameter set from the external parameter memory and starts reading mode straight away) • Blinks for approx. 10 s together with the "Read Result" LED, then lights up constantly. (CLV has loaded the parameter set from the external parameter memory with **tolerated errors**[1] and starts reading mode straight away) • Lights up constantly (CLV could not find an external parameter memory and loads the internal parameter set instead) • Blinks constantly together with the "Read Result" LED[2] (The external parameter memory is either empty, contains the parameter set for a different CLV type, or is corrupt. CLV has loaded the internal parameter set. It starts Reading mode but does not output data over the host interface.) **Start option: START WITH INTERNAL PARAMETERS:** • Lights up constantly (CLV has loaded internal parameter set) **Start option: START WITH COPY INTERN -> EXTERN:** • **Blinks alternately with the "Read Result" LED for approx. 10 s before lighting up constantly** (CLV has successfully copied the internal parameter set to the external memory and has reset the start option to START WITH EXTERNAL PARAMETERS). CLV has loaded the internal parameter set. • Blinks constantly together with the "Read Result" LED[2] (The external parameter memory is either not connected or corrupt, or the parameter set is too large to be copied). CLV has loaded the internal parameter set.
	Read Result	*Green*	**Start option: START WITH EXTERNAL PARAMETERS (default):** • Blinks for approx. 10 s together with "Device Ready" LED [1] (see above) or • Blinks constantly together with the "Device Ready" LED [2] (see above) **Start option: START WITH COPY INTERN -> EXTERN:** • Blinks alternately with "Device Ready" LED for approx. 10 s (see above) or • Blinks constantly together with the "Device Ready" LED [2] (see above)
Reading mode	**Device Ready**	*Green*	• Lights up constantly • Extinguishes with new operating mode/function
	Sensor	*Green*	• Lights up if reading diode active (The laser diode is activated/deactivated by the reading pulse) • Lights up constantly in Free-running mode, since the laser diode is constantly active
	Read Result	*Green*	LED is linked to the "Result 2" output and indicates the selected result status for the defined pulse duration of the output. • Lights up after a successful read (Good Read) • Lights up if the match code comparison is active, the bar code read matches the specified match code(s) and the corresponding result output is selected for the "Result 2" output

1) We recommend that you check the parameter set manually, e. g. by printing out the entire configuration. For troubleshooting, see also *Chapter 8.3.2 LED error messages for the external parameter memory, Page 8-5*

2) Stops blinking when you switch from Reading mode to Parameterization mode

Table 3-3: Meaning of LEDs: CLV with external parameter memory

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Operating mode	LED	Display	Function
Reading mode (contd.)	**Data**	*Yellow*	• Flickers when the CLV transmits data to the host over the host interface
Percentage evaluation	**Sensor** **Read Result**	*Green* *Green*	• Lights up constantly, since Free-running mode is active Behavior dependent on the reading quality: • Extinguishes if reading rate < 30 % • Blinks twice a second if reading rate 30 % ... 70 % • Blinks five times a second if reading rate 70 % ... 90 % • Lights up constantly if reading rate > 90 %
Adjusting mode	**Sensor**	*Green*	• Lights up constantly, since Free-running mode is active
Show CP-limits	**Sensor**	*Green*	• Blinks bright/dark alternately, in the frequency with which the scan line is (partially) masked out

Table 3-3: Meaning of LEDs: CLV with external parameter memory

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Notes

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4 Installation

4.1 Installation sequence

- Change the language version of the laser warning label (if necessary)
- Select the mounting location for the CLV
- Align the CLV with the bar code
- Mount the CLV
- Mount the AMV/S 60 Connection Module
- Connect the CLV to the AMV/S 60 Connection Module
- Adjust the CLV so that it is in line with the bar code
- Mount the reading pulse sensor for external triggering the reading pulse
- Option with event-controlled dynamic focus control:
  mount the sensors for detecting the object distance

4.2 Preparations

4.2.1 Required components

- CLV Bar Code Scanner

4.2.2 Required accessories

- SICK mounting bracket for the CLV:
  depending on the order, angle bracket no. 2 013 824, articulated bracket no. 2 018 435, or quick-clamping device no. 2 016 110 with securing material for the CLV

– or –

Alternatively, if the bracket is supplied by the user

  – Stable mounting device that allows the alignment of the CLV to be varied in the x and y axes. The weight of the CLV (line scanner) is 1.5 kg and 2.2 kg as a line scanner with oscillating mirror.
  – 2 screws M 6 for the CLV. The screw length depends on the wall thickness of the bracket used. Depth of engagement in **CLV max. 7 mm** from housing surface.

- AMV/S 60 Connection Module (not included in the scope of supply of the CLV)
- Reading pulse sensor for external reading pulse triggering, e. g. photoelectric reflex switch/ photoelectric proximity switch (not included in the scope of supply of the CLV)
- Option with event-controlled dynamic focus control: sensors for detecting the object distance, e. g. photoelectric reflex switches/photoelectric proximity switches (not included in the scope of supply of the CLV)

4.2.3 Required auxiliary parts

- 2 screws M 6 for securing the SICK mounting bracket to the base. The screw length depends on the wall thickness of the base.
- Set of laser warning labels (if necessary)
- Tool
- Measuring tape (up to 3 000 mm)
- Protractor

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4.2.4 Replacing the laser warning label

If necessary, replace the GB/US laser warning label with the required language (*Fig. 4-1*).

The device is delivered with a set of laser warnings in:

- German/US laser warning and
- French/US laser warning

See also *Chapter 2.3 General safety instructions and protection measures, Page 2-1*.

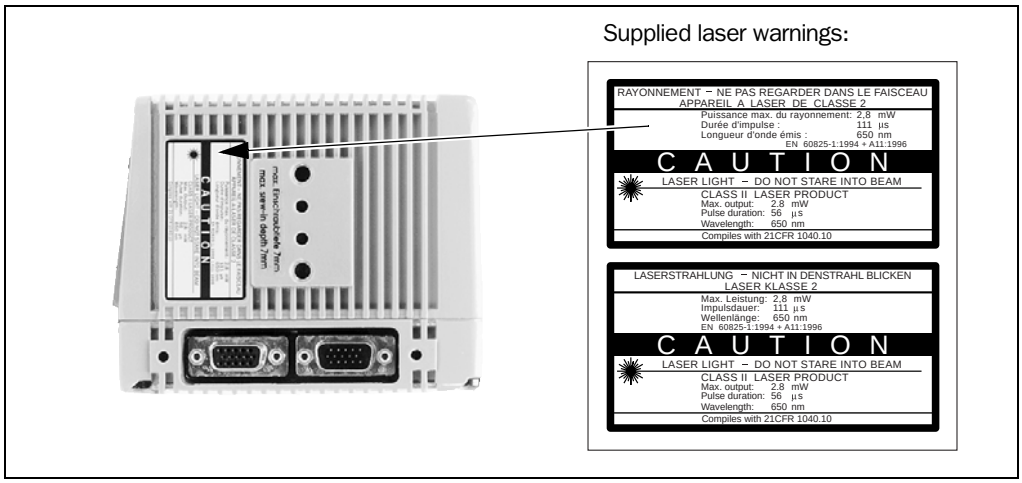
Supplied laser warnings:
RAYONNEMENT – NE PAS REGARDER DANS LE FAISCEAU
APPAREIL A LASER DE CLASSE 2
Puissance max. du rayonnement: 2,8 mW
Durée d'impulse : 111 µs
Longueur d'onde émis : 650 nm
EN 60825-1:1994 + A11:1996
C A U T I O N
LASER LIGHT – DO NOT STARE INTO BEAM
CLASS II LASER PRODUCT
Max. output: 2.8 mW
Pulse duration: 56 µs
Wavelength: 650 nm
Complies with 21CFR 1040.10
LASERSTRAHLUNG – NICHT IN DENSTRAHL BLICKEN
LASER KLASSE 2
Max. Leistung: 2,8 mW
Impulsdauer: 111 µs
Wellenlänge: 650 nm
EN 60825-1:1994 + A11:1996
C A U T I O N
LASER LIGHT – DO NOT STARE INTO BEAM
CLASS II LASER PRODUCT
Max. output: 2.8 mW
Pulse duration: 56 µs
Wavelength: 650 nm
Complies with 21CFR 1040.10

Fig. 4-1: Line scanner: replacing the laser warning labels

4.2.5 Selecting the mounting location

When you select the mounting location, the distance between the CLV and the host and between the CLV and the bar code are extremely important.

Distance between the CLV and the host

The CLV can be mounted at a maximum distance of 1 200 m from the host without a connection to the SICK network or a bus. In practice, however, the distance depends on the physical configuration of the host interface and the data transfer rate (see *Table 5-7, Page 5-8*).

Distance between the CLV and the AMV/S 60 Connection Module

The AMV/S 60 Connection Module should not be located further than 10 m from the CLV, since the "CLV-Setup" program on the PC accesses the terminal interface (RS 232) of the CLV via this module.

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4.2.6 Mounting accessories

The CLV is secured in position using the two tapped blind holes (M 6) above the electrial connections. *Fig. 4-2* shows the location of the threads near the line scanner.

The dimensions of the CLV housing are shown in *Fig. 9-1 to Fig. 9-2, Page 9-4*.

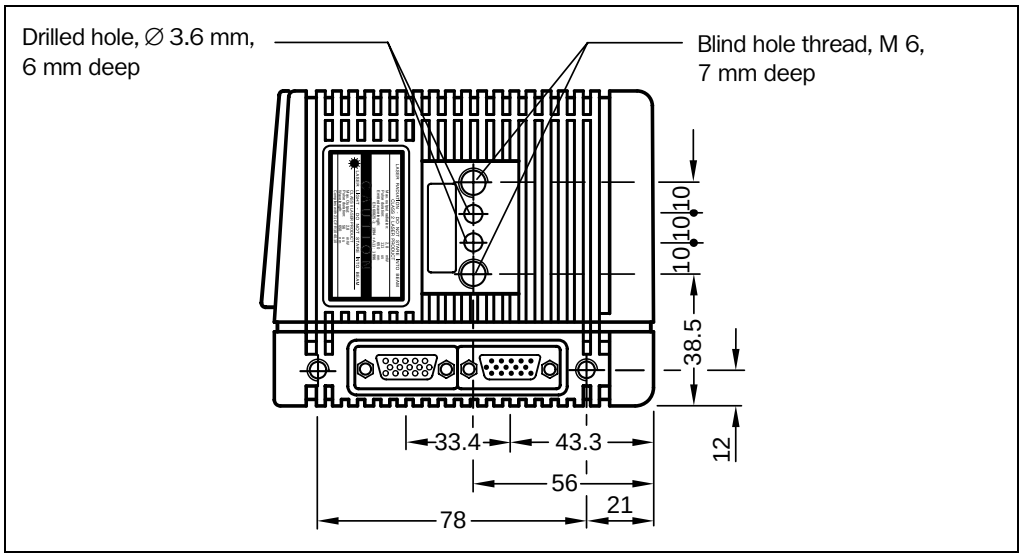

Fig. 4-2: Line scanner: position of the securing threads on the CLV

The CLV can be mounted using the SICK bracket:

- Mounting bracket, single no. 2 013 824
- Articulated bracket (2 x mounting bracket, single) no. 2 018 435
- Quick-clamping device no. 2 016 110

The brackets are designed to support a variety of mounting positions and alignments in two planes. *Fig. 4-3* shows two mounting examples.

The elongated holes in the mounting bracket no. 2 013 824 and in the articulated bracket no. 2 018 435 allow the CLV to be adjusted with a freedom of rotation of ±15°.

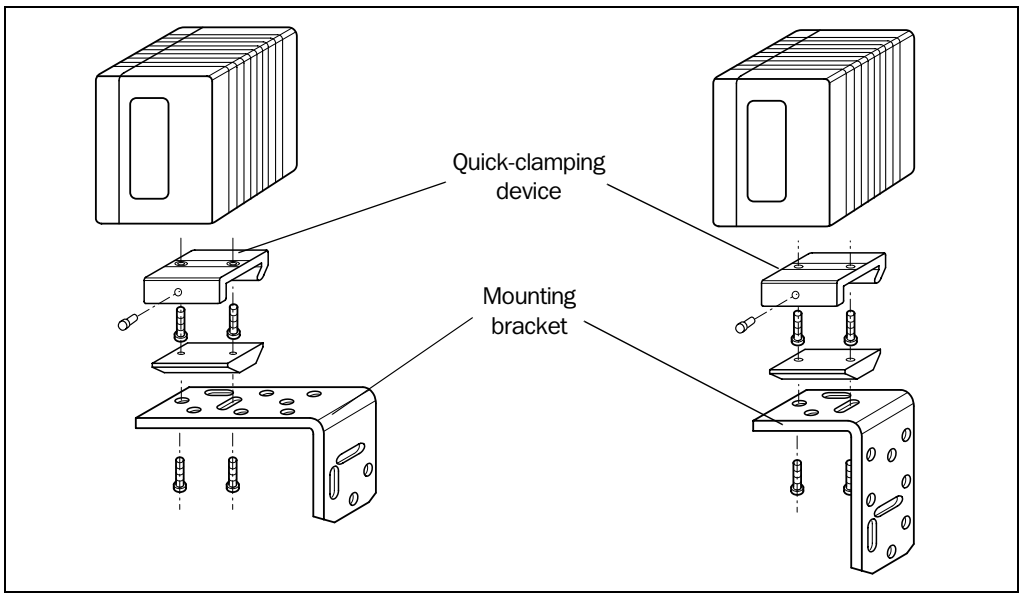

Fig. 4-3: Line scanner: Mounting possibilities of the CLV

The dimensions of the mounting brackets are shown in *Chapter 10.14 Dimensioned drawings of the accessories, Page 10-75*

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4.2.7 Distance between the CLV and the bar code

Basic alignment between the CLV and the bar code

Depending on the application, the line scanner or line scanner with oscillating mirror versions of the CLV is used. *Fig. 4-4* shows how the device is aligned with the bar code on the object for each of the two scanning methods.

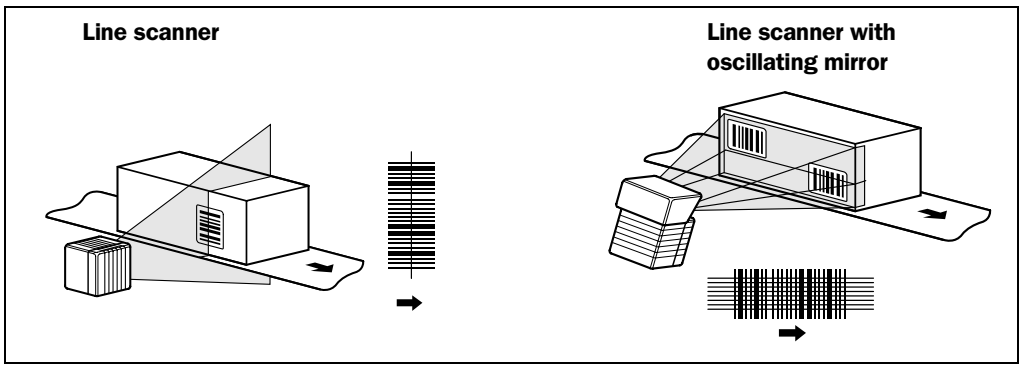

Fig. 4-4: Scanning methods: alignment with bar code and conveyor direction

Reading distance from the bar code and aperture angle α

The distance between the reading window of the CLV and the bar code must not exceed the technical limits. The height of the reading field is shown as a function of the reading distance for various resolutions (module widths) depending on the CLV type in *Chapter 10.2 Specification diagrams, Page 10-1*.

Fig. 4-5 shows the definition of the reading distance a from the reading window and of the aperture angle α each of the two scanning methods.

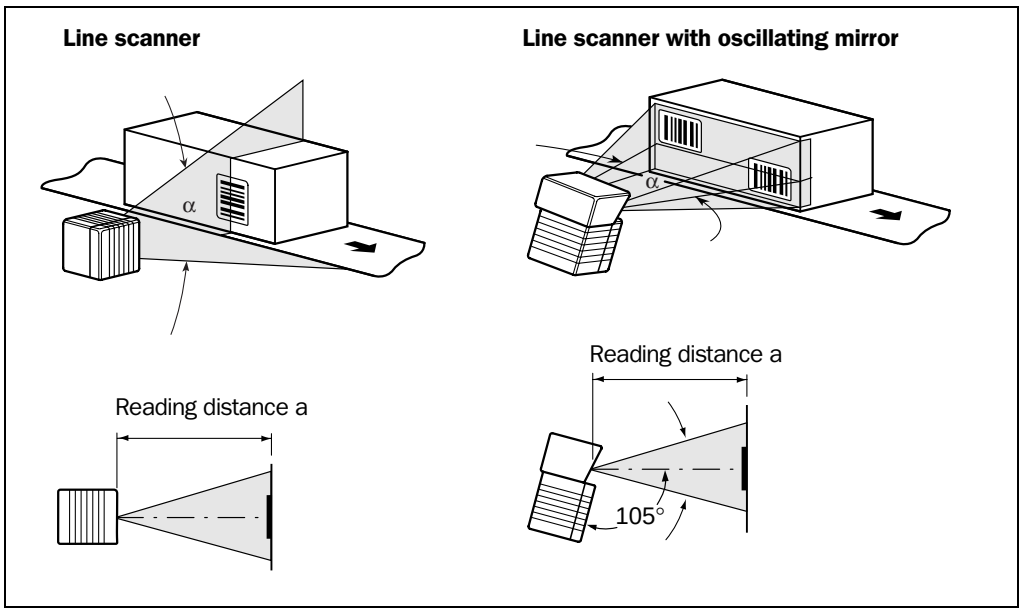

Fig. 4-5: Definition of the reading distance a and of the aperture angle α

The useful aperture angle is typically **56**° for the line scanner and max. **50**° for the line scanner with oscillating mirror. Due to the V-principle of beam deflection, the reading field height (for evaluating the useful length of the scan line) depends on the readling distance.

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Angular alignment of the CLV

The alignment of the CLV is optimum when the scan line travels over the bar code lines almost at a right angle (90°) (*Fig. 4-4*). All possible reading angles that can occur between the scan line and the bar code must be taken into consideration (*Fig. 4-6* and *Table 4-1*).

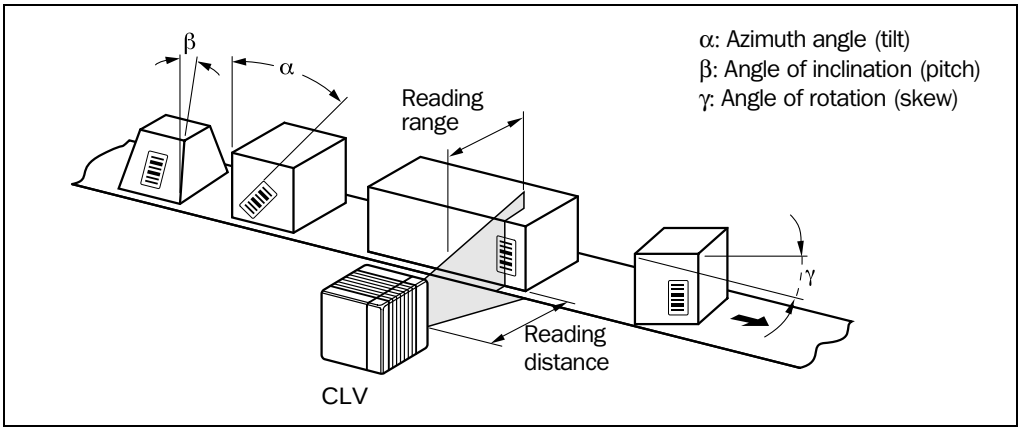

Fig. 4-6: Line scanner: Reading angle between the scan line and the bar code

Angle	Limit value
Tilt α (azimuth)	max. 45°
Pitch β	max. 45°
Skew γ	max. 45°

Table 4-1: Permissible reading angles between the scan line and bar code

Avoiding surface reflection

If the light from the scan line strikes the surface of the bar code vertically, interference may be caused by reflections when the returned light is received. To avoid surface reflection, the CLV must be mounted in such a way that the emitted light is tilted slightly with respect to the vertical axis (*Fig. 4-7*).

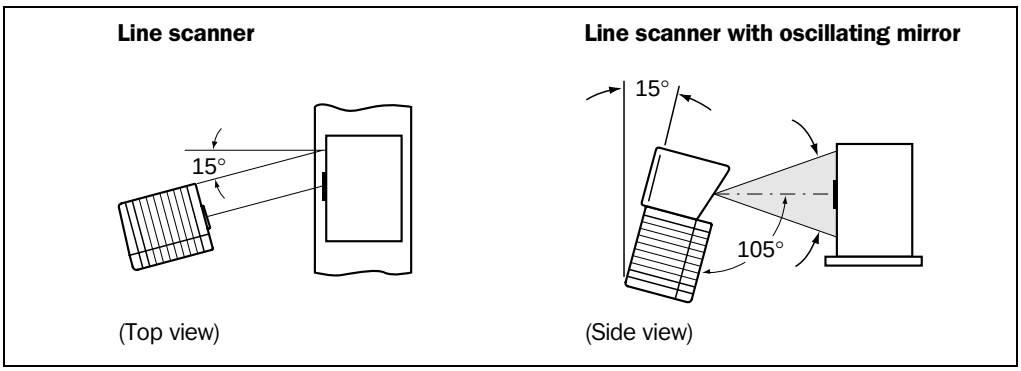

Fig. 4-7: Avoiding surface reflections: Angle between the emitted light and the bar code (tilted away from the vertical axis)

In the case of the line scanner with oscillating mirror, the laser beam is emitted at an angle of 105° with respect to the housing as it passes through the neutral position (CW = 50) while oscillating. The device can only be flush-mounted with the conveyor belt with limited deflection ranges. Otherwise, the device must also be mounted at an angle of 15° to ensure that the deflection ranges are symmetric.

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Note In oscillating mode with variable amplitude, the scan line must always sweep the neutral position (CW = 50). This means that oscillation is not possible in the range 60 CW to 80 CW, for example, but is possible in the range 40 CW to 80 CW.

4.2.8 Count direction of the code position CP and code angle CW

Explanation The CLV can scan and decode several bar codes with each read. In doing so, it determines the specific local reading diagnosis data for each bar code:

- The position (CP value) of the center of the bar code within the scan line
- (Scanning method using the oscillating mirror) also the angle of deflection of the scan line (CW value) at which the center of the bar code is recorded

Fig. 4-8 shows the count direction of the code position and code angle. In the case of the line scanner, the count direction of the code position is marked by a small triangle above the reading window.

By determining this data, the device can separate identical bar codes (code type, code length, and data content identical) and assign the bar code data in the reading result to its position on the object.

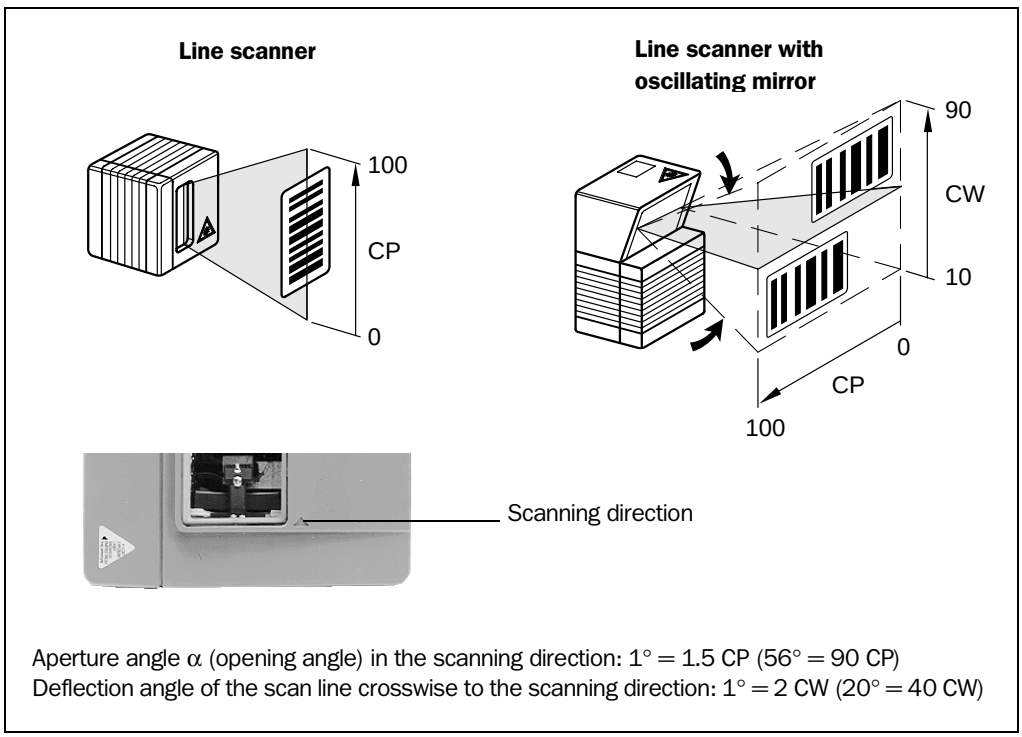

Fig. 4-8: Count direction of the code position CP in the scan line and of the code angle CW for the oscillating mirror

Tip In the default setting, the CLV does not output the "CP" and "CW" values (line scanner with oscillating mirror only) in the reading result on the host interface. If this is required to evaluate the result in the host, the values can be included in the separator of the output string using the "CLV-Setup" program.

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Configuring the separator:

1. Choose the DATA STRINGS tab.
2. Click the SEPARATOR field.
   The EDIT PARAMETER TFS dialog box is displayed.
3. In the list field, click the CP and/or CW parameters.
   CP and/or CW then appears in the top line.
4. Confirm your selections with OK.
5. Download the data to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
6. Confirm the dialog box by choosing PERMANENT.
   The CLV outputs the CP value and the CW value on the host interface for each bar code in the reading result. The values are displayed as a 3-digit number in the associated separator.

4.3 Mounting and adjusting the device

4.3.1 Mounting the CLV

1. Prepare the base for mounting the bracket as described in *Chapter 4.2.2 Required accessories, Page 4-1*.
2. Place the object containing the bar code within the reading field of the CLV (in the position at which it is to be read) with the conveyor belt switched off.
3. Align the CLV with the bar code (in accordance with the scanning method) in such a way that
   – with the line scanner the back of the device with the LEDs is almost parallel with the bar code surface,
   – with the line scanner with oscillating mirror, the broad side wall (back of the oscillating mirror) is almost parallel with the bar code surface

   All of the possible reading angles must be taken into consideration (see *Fig. 4-6, Page 4-5*).
4. If it is relevant for the evaluation, note the count direction of the code position and code angle (see *Fig. 4-8, Page 4-6*).
5. Mount the CLV bracket on the base.

CAUTION

Risk of damage to the housing!

The maximum depth of engagement of the two blind hole threads M 6 is 7 mm.
Longer screws will damage the housing.

➢ Use screws with the correct length.

6. Screw the screws M 6 through the bracket into the blind hole threads of the CLV.
7. Tighten the screws slightly.
8. Adjust the CLV as described below.

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4.3.2 Adjusting the CLV

The CLV can be adjusted in Percentage Evaluation mode. In this mode, the CLV displays the quality of the bar code reads that enter the CLV reading field statically (the object is not moved on the conveyor belt). The CLV performs 100 scans and evaluates the reading quality statistically. It then outputs the reading results every 2 s on the terminal interface.

The behavior of the "Read Result" LED also indicates the reading quality:

– The LED does not light up if the CLV cannot read the bar code (reading quality < 30 %).
– If the CLV is having problems reading the bar code (reading quality 30 % ... 90 %), the LED blinks.
– The CLV is aligned optimally when the LED lights up constantly (reading quality > 90 %).

The scanning frequency in the default setting is 800 Hz.

1. Connect the CLV to the AMV/S 60 Connection Module and switch on the power supply (see *Chapter 5.5.3 Connecting the supply voltage, Page 5-13*).
   After it has started, the CLV confirms that the self-test was successfuly and switches to reading mode ("Device Ready" LED lights up).
2. Connect the PC to the terminal interface of CLV via the RS 232 line using the internal 9-pin "Service" plug of the AMV/S 60 (see *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*).
3. Start Windows and the "CLV-Setup" program (see *Chapter 10.6.3 Starting CLV-Setup, Page 10-43*).

Choosing the standard decoder:

4. Choose the CODE CONFIGURATION tab.
5. Click the STANDARD option in the DECODER section.
6. Download the settings to the CLV by clicking on the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
7. Confirm the dialog box by choosing TEMPORARY.
   The CLV then operates with the standard decoder.

Activating Percentage Evaluation mode:

8. From the VIEW menu, choose PERCENTAGE EVALUATION.
   The dialog box for entering the distance configuration appears.
9. Click the relevant distance configuration for the reading distance:
   – with autofocus mode the distance configuration no. 1
   – with event-controlled dynamic focus control the distance configuration that matches the reading distance of the object (default: no. 1, focus position F = 1 200 mm).
10. Confirm the dialog box with OK.
    The Terminal Emulator is launched and displays the reading result continuously (see *Chapter 6.5.2 Percentage evaluation, Page 6-22*).
    Monitor the **reading quality (%)** during each of the subsequent steps!

    Line scanner with oscillating mirror:
    In the "Percent Evaluation" mode, the CLV behaves in the following manner:
    – in "Oscillating" mode (default setting: oscillating with a fixed amplitude), the CLV shuts off oscillation and positions the scan line under the angle CW = 50 (corresponds to an angle of deflection of 105°). This position cannot be altered.
    – in "One-Shot" mode, the CLV also positions the scan line under the angle CW = 50
    – in "Set Position" mode, the scan line's selected position remains unchanged.

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Performing fine adjustment:

11. Align the CLV in such a way that the angle between the scan line and the bars on the bar code CLV is almost 90°. The oscillating mirror must be aligned in such a way that the scan line is located at the center of the bar code, perpendicular to the bar code lines, when it is in the neutral position (CW = 50).
12. To avoid interfering reflections, tilt the line scanner away from the vertical axis so that the light strikes the bar code at an angle of approx. 105° (see *Fig. 4-7, Page 4-5*).
13. If necessary, position the scan line exactly at the direct center of the bar code. *Chapter 4.3.3 Adjusting mode* below.
14. Move objects carrying bar codes into the CLV reading field manually under realistic conditions and check the reading result. If the objects are aligned randomly, or if the bar code is located at different positions (angles), ensure that the limit values of the permissible reading angles are not exceeded.
15. Adjust the CLV in such a way that the good read rate is between **70 ... 100 %**. With event-controlled dynamic focus control, for each defined reading range (distance configuration), check the selected focus position and correct the parameter settings if necessary (see *Chapter 6.4.4 Guide to parameterization menu, Page 6-8*).
16. Tighten the screws on the CLV.

The CLV is aligned with the bar code.

4.3.3 Adjusting mode

The "Adjusting mode" helps you to position the **center** of the scan line on the object. To do so, the CLV masks out one half of the scan line from the center (code position CP = 50 to CP = 100). This is irrespective of whether the CLV is operated in Autofocus mode or with distance configurations for event-driven dynamic focus control. *Fig. 4-9* shows the resulting position of the scan line (line scanner).

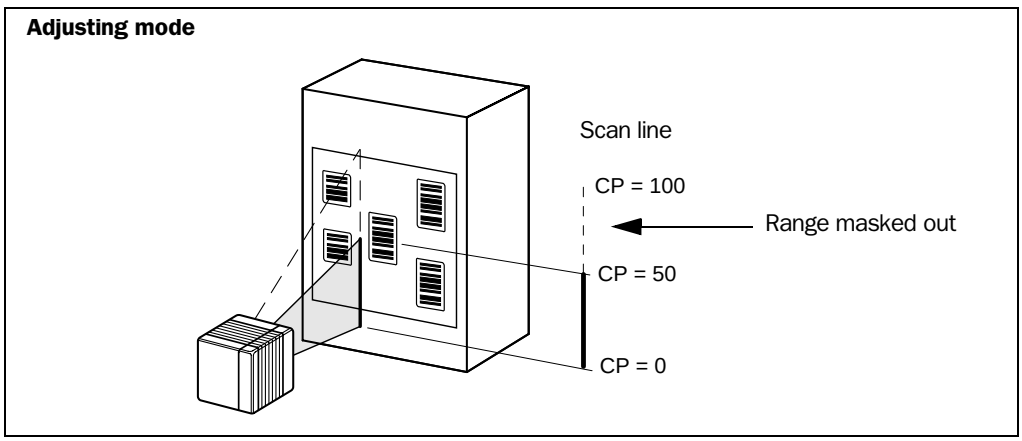

Fig. 4-9: Line scanner: scan line in Adjusting mode

Line scanner with oscillating mirror:

In "Adjusting" mode, the oscillating mirror behaves in the same manner as within the "Percent Evaluation" mode (*see Page 4-8, "Activating Percentage Evaluation mode").*

1. Activate the operating mode as described in *Chapter 6.5.3 Adjusting mode, Page 6-24*.
2. Position the CLV in such a way that the center of the scan line, indicated by the end of the scan line (code position CP = 50), is located at the center of the bar code, or at the center of the field for all codes if several bar codes are used.

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Show CP Limits

The "Show CP Limits" operating mode allows you to test whether the desired effect was produced by narrowing the scan line's active evaluation range. The CLV alternatively hides certain parts of the scan line in accordance with the selected min. and max. values of the code position.

For activation of this operating mode and for checking, See *Chapter 6.5.5 Show CP-limits, Page 6-26*.

4.4 Mounting the external components

4.4.1 Mounting the AMV/S 60 Connection Module

1. Mount the AMV/S 60 Connection Module near the CLV.
   The distance between the AMV/S 60 and CLV should not exceed max. 10 m.
2. Mount the AMV/S 60 in such a way that accessed to the open device is always possible. The terminal interface of the CLV is accessed via the internal "Service" plug.

Detailed information on the mounting and electrical installation procedures is provided in the Operating Instructions for the "*AMV/S 60 Connection Module*" (order no. 8 008 296).

4.4.2 Mounting the external reading pulse sensor

If the CLV is triggered by an external reading pulse sensor, the sensor must be mounted in the vicinity of the CLV. The "Sensor" switching input is selected as the default trigger source for this trigger type. The default debounce time of the input is 30 ms.

Fig. 4-10 shows two examples of where a photoelectric reflex switch can be mounted. This depends on the distance a from the bar code to the front of the object. Depending on the application, you may need to mount the sensor in such a way that bar codes on objects of different sizes can be read completely during the reading interval.

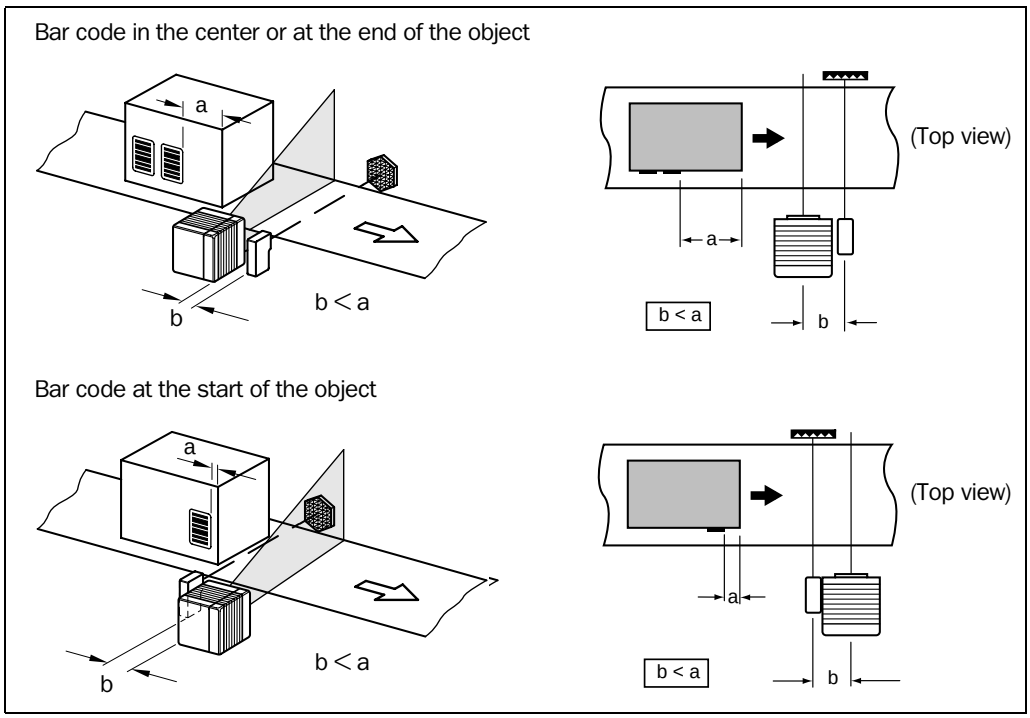

Fig. 4-10: Line scanner: mounting example for the external reading pulse sensor

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1. Mount the reading pulse sensor.
2. Connect the reading pulse sensor to the "Sensor" switching input of the CLV via the AMV/S 60 Connection Module (see *Chapter 5.5.7 Connecting the switching inputs, Page 5-16*).
3. Connect the CLV to the AMV/S 60 Connection Module and switch on the power supply to the module (see *Chapter 5.5.3 Connecting the supply voltage, Page 5-13*).
   After it has started, the CLV confirms that the self-test was successfull and switches to Reading mode ("Device Ready" LED lights up).
4. Connect the PC to the terminal interface of CLV via a RS 232 data connection cable using the internal 9-pin "Service" plug of the AMV/S 60 (see *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*).
5. Start Windows and the "CLV-Setup" program (see *Chapter 10.6.3 Starting CLV-Setup, Page 10-43*).

6. From the VIEW menu, choose READING MODE.
   The Terminal Emulator is launched. The CLV is in Reading mode (default: SMART decoder).
   Monitor the reading result during each of the subsequent steps!

   Line scanner with oscillating mirror:
   In default setting, the CLV deflects the scan line (default setting) about the fixed position CW = 50 with a frequency of 1 Hz at a max. angle of ±20° (±40 CW).
   50 CW corresponds to an angle of emergence of 105°.
7. Move objects with bar codes into the CLV reading field manually under realistic conditions and check whether the reading result and trigger pulse are correct.
8. Repeat the procedure with the conveyor switched on. Check whether the reading procedure is synchronized with the objects.

Parameterizing an external sensor as a trigger source:

These settings are not required if the CLV is operated with the default configuration.

1. Choose the DEVICE CONFIGURATION tab.
2. In the READING TRIGGER MODE section click the option SENSOR INPUT (ACTIVE HIGH).
3. Download the settings to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
4. Confirm the dialog box by choosing PERMANENT.
   The CLV operates with the "Sensor" switching input as an external trigger source. The reading pulse starts when the input is energized (high).

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4.4.3 Mounting the sensors for detecting the object distance

If the dynamic focus control function of the CLV is triggered by external sensors, suitable sensors must be mounted in the vicinity of the CLV. *Fig. 4-11* shows an example of a read operation from above. The sensors must be arranged in such a way that all of the potential object heights are classified uniquely and overlapping reading ranges occur that can be formed with the depths of field of the CLV. A maximum of five switching inputs are available for this purpose. A max. of 32 switching states for 8 distance configurations (reading ranges) can be implemented using the internal assignment table (combinations). Photoelectric reflex switches, for example, can be used to detect the object distance. In the default setting, all five "IN 0 ... IN 4" switching inputs are selected for dynamic focus control.

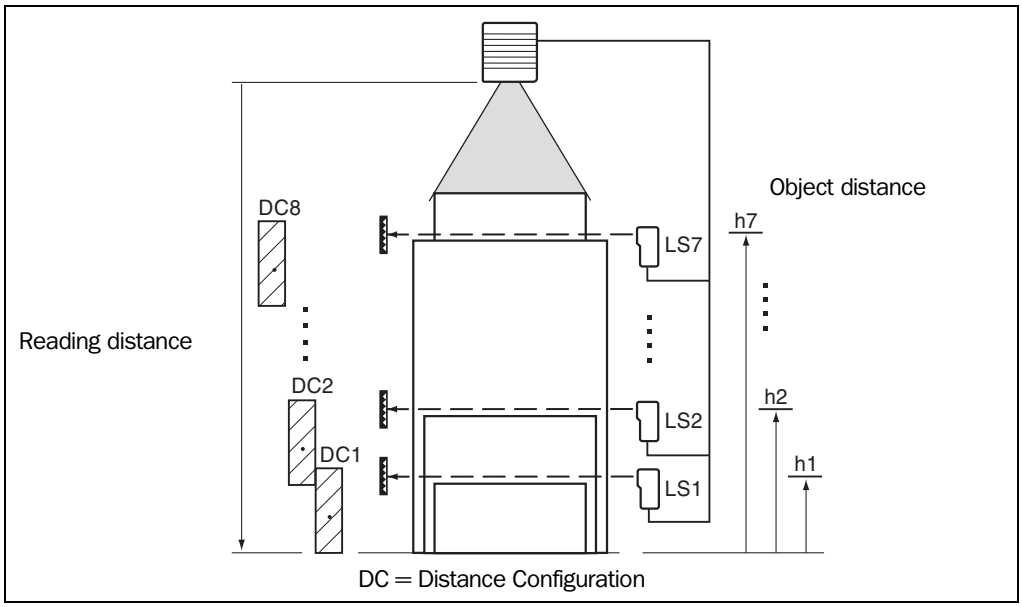

Fig. 4-11: Mounting example for object distance detection

1. The depths of field of the CLV for the bar code resolution in question is shown in the graphs in *Chapter 10.2 Specification diagrams, Page 10-1* onwards. Find and note suitable focus positions for overlapping reading ranges.
2. Mount distance sensors (e. g. photoelectric reflex switches) one above the other in a row at the mounting location to measure the object distance (see also assignment *Table 5-20, Page 5-18*). It is advisable to mount these distance sensors opposite the direction of motion of the conveyor belt at approx. 100 mm in front of the reading pulse sensor.
3. Connect the distance sensors to the "IN 0 ... IN 4" switching inputs on the CLV via the AMV/S 60 Connection Module (see *Chapter 5.5.7 Connecting the switching inputs, Page 5-16*).

4. Set the focus positions for the required reading ranges on the READING CONFIGURATION tab in the "CLV-Setup" program. To do so, click the DISTANCE CONFIGURATION/ASSIGNMENT TABLE button and edit the required entries in the dialog box that is then displayed.
5. As described in *Chapter 4.3.2 Adjusting the CLV, Page 4-8*, choose the standard decoder and start Percentage Evaluation mode temporarily.
6. Check the reading quality in all distance configurations while the conveyor belt stationary.
7. Then check the distance detection function in Reading mode under realistic conditions. To do so, monitor the reading result in the Terminal Emulator as described in *Chapter 4.4.2 Mounting the external reading pulse sensor, Page 4-10*.

Default: Focus position F 1 up to F 8 = 1 200 mm.

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Note The CLV can switch between a maximum of 8 distance ranges for slow search runs using the integrated timer or the oscillating mirror reversal points.
The CLV can be switched between a maximum of 8 distance ranges synchronously to the reading process using command strings.

4.5 Dismantling the device

1. Switch off the power supply to the AMV/S 60 Connection Module.
2. Undo the screws for the cable connections on the CLV and disconnect the cables.
   With mounted external parameter memory (optional):
   Undo both screws and remove the cover.
3. Unscrew the CLV from the mounting device.

When removing the device from service for the last time, please dispose of it in an environmentally-friendly manner, as described in *Chapter 7.3 Disposal, Page 7-2*.

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Notes

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5 Electrical installation

5.1 Installation sequence

- Connect the CLV to a SICK Connection Module from the series AMV/S, BMV/BMH 10 or BMS 20, or using a customer-specific wiring configuration
- Connect the data and function interfaces of the CLV in the module
- Connect the PC to the Connection Module (at the terminal interface on the CLV)
- Connect the power supply to the Connection Module

5.1.1 SICK Connection Modules (overview)

CLV Type	**Temperatur range**	**Connection module**	**Purpose**	**see chapter**
CLV **without** heater	0 ... +40 °C	AM**V** 60	– Connecting **one** CLV – Operating voltage 18 ... 30 V DC – Enclosure rating IP 30, max. IP 54	*5.2.3*
		AM**S** 60	– Connecting **one** CLV – Operating voltage 230 V AC (115 V)/24 V DC – Enclosure rating IP 30, max. IP 54	*5.2.3*
		AMV 100	– Connecting **one** CLV – Operating voltage 18 ... 30 V DC – Enclosure rating IP 52, with connector cover max. IP 65	*5.2.3*
		BMV/BMH 10 Bus Connection Module	– Connecting **one** CLV to the Profibus-DP, DeviceNet or Ethernet – Operating voltage 20 ... 30 V DC – Enclosure rating IP 52, with connector cover max. IP 65	*5.2.4*
		BMS 20 Interbus-S	– Connecting **one** CLV to the Interbus-S – Operating voltage 24 V DC – Enclosure rating max. IP 54	*5.2.4*
		AMV 30-071	– Connecting **two** CLVs – Operating voltage 18 ... 30 V DC – Enclosure rating IP 30, max. IP 54	*5.2.3*
		AMV 200	– Connecting **two** CLVs – Operating voltage 18 ... 30 V DC – Enclosure rating IP 52, with connector cover max. IP 65	*5.2.3*
CLV **with** heater – Line scanner – Line scanner with oscillating mirror	 –35 ... +35 °C –35 ... +35 °C	AMV 100	– Connecting **one** CLV – Operating voltage 24 V DC +20%/–10% – Enclosure rating IP 52, with connector cover max. IP 65	*5.2.5*
		AMV 200	– Connecting **two** CLVs – Operating voltage 24 V DC +20%/–10% – Enclosure rating IP 52, with connector cover max. IP 65	*5.2.3*

Table 5-1: Connection Modules for the CLV

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5.2 Electrical connections and cables

The electrical connections on the CLV consist of two 15-pin D Sub HD connections on the housing, one plug, and one socket.

These connections are used to route the following interfaces:

- Three serial data interfaces (host interface, CAN interface and terminal interface)
- Six switching inputs (external reading pulse and multifunctional inputs)
- Four switching outputs (for result status function, for connecting to a PLC for example)
- CAN bus (for OTS operation)
- Power supply

5.2.1 Wire cross-sections

CLV without heater:

➢ All connections must be wired with copper cables with a minimum wire diameter of 0.15 mm^2!

CLV with heater:

➢ Connect the power supply terminals (Pin 1/Pin 5) using copper wires with a minimum cross-section of 0.75 mm^2 at a maximum length of 10 m!

5.2.2 Prefabricated cables (overview)

CLV Type	Temperature range	Connection module	Optional cables	Length	Type
CLV **without** heater	0 ... +40 °C	AMV/S 60	2 x No. 2 020 302 or 1 x No. 2 020 307	3 m 3 m	Connecting cable (plug/socket) Ext. parameter memory with 2 cables (plug/socket)
		BMV/BMH 10 Bus Connection Module	1 x No. 2 020 307 or 1 x No. 2 021 298	3 m 3 m	Ext. parameter memory with 2 cables (plug/socket) Connector cover to connector cover
		AMV 30-071	2 x No. 2 020 302 or 1 x No. 2 020 307	3 m 3 m	Connecting cable (plug/socket) Ext. parameter memory with 2 cables (plug/socket)
		BMS 20 Interbus-S	1 x No. 2 020 264 + 1 x No. 2 020 265 or 1 x No. 2 020 308	3 m 3m 3m	Connecting cable with plug/open end Connecting cable with plug/socket Ext. parameter memory with 2 cables (plug/open end)
		Non-Sick Power pack	1 x No. 2 020 303 + 1 x No. 2 020 264 or 1 x No. 2 020 981 or 1 x No. 2 021 267	3 m 3 m 3 m 3 m	Connecting cable with socket/open end Connecting cable with plug/open end Ext. parameter memory with 2 cables (open ends) Connector cover with 2 cables (open ends)
CLV **with** heater	– 35 ... +35 °C	AMV 100	1 x No. 2 021 298 or 1 x No. 2 021 689	3 m 3 m	Connector cover to connector cover Ext. parameter memory to connector cover
		AMV 200	2 x No. 2 021 298 or 2 x No. 2 021 689	3 m 3 m	Connector cover to connector cover Ext. parameter memory to connector cover
		Non-Sick Power pack	1 x No. 2 021 267	3 m	Connector cover with 2 cables (open ends)

Table 5-2: Cables for connecting the CLV

For technical data on the cables, see *Chapter 10.13.4 Cables, external parameter memories and plug cover, Page 10-73*.

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5.2.3 Connections/cables for the AMV/S Connection Module

The AMV/S Connection Module is suitable for connecting the CLV to peripherals (distribution function) and the power supply. The module can be used to establish a connection to the host (point-to-point) or integrate the device in a SICK network or daisy-chain configuration (pass-through or master/slave configuration). The module is available in several variants (see *Table 5-1, Page 5-1*).

Fig. 5-1 shows the connection principle of the AMV/S 60 for one CLV.

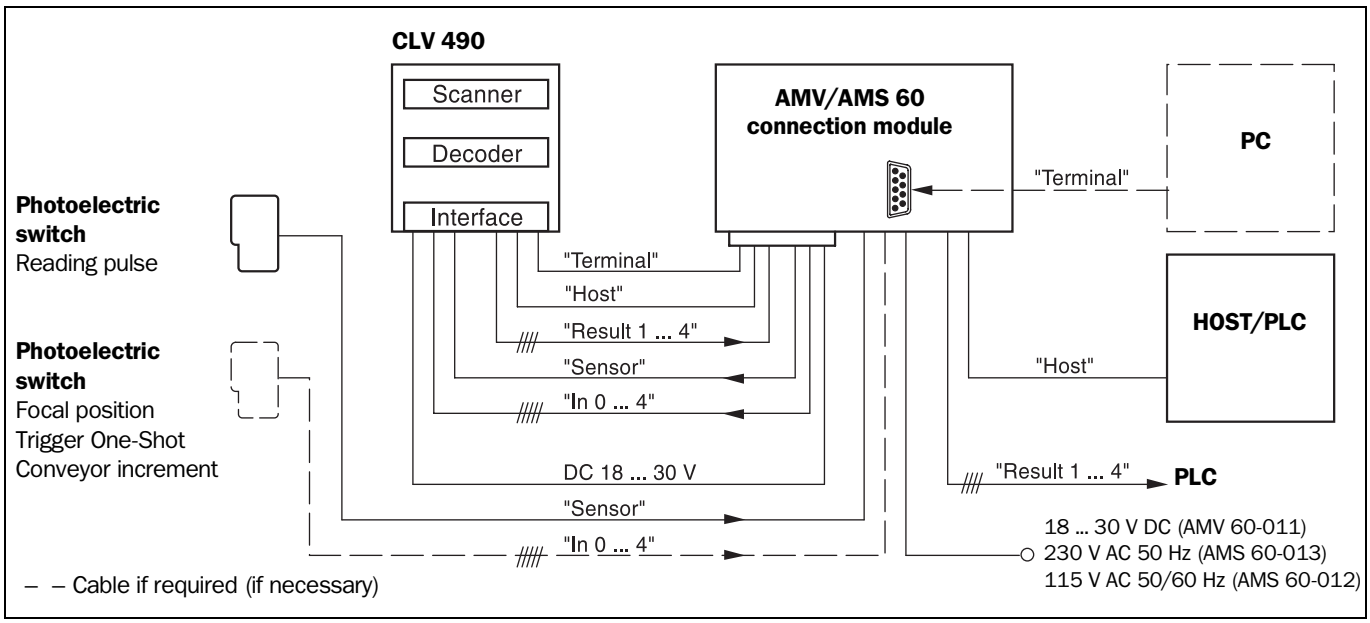

Fig. 5-1: Block diagram: Connection of the CLV to the AMV/S 60 connection module

Connecting the CLV to the AMV/S

Two cables no. 2 020 302 are required to connect the CLV to the AMV/S. Alternatively, the device can be connected via the external parameter memory no. 2 020 307.
See *Chapter 5.2.5 Connections/cables for the external parameter memory (connection to AMV/S or BMV 10/BMS 20), Page 5-4*.

a) CLV without heater:

Connection modules: AMV/S 60 and AMV 30-071.
The cables no. 2 020 302 can be extended to 10 m (terminal interface: RS 232!).

b) CLV with heater:

Connection modules: AMV 100 and AMV 200.
The cables no. 2 020 302 must **not** be extended!
If longer cables are required, the entire power supply system (Pin 1/Pin 5) must be connected with a wire cross-section of at least 0.75 mm² with a maximum length of 10 m.

Recommendation Use the cable no. 2 021 298 (with two connector covers, length 3 m).

The procedures for connecting and configuring the AMV/S Connection Modules are described in the following documentation:

- Operating Instructions for the "*AMV/S 60 Connection Module*" (no. 8 008 296)
- Operating Instructions for the "*AMV 30-071 Connection Module*" (no. 8 008 648)
- Operating Instructions for the "*AMV 100/200 Connection Module*" (no. 8 008 879)

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5.2.4 Connections/cables for the Bus Connection Modules BMV 10 and BMS 20

The BMV 10 Bus Connection Module (depending on the model) is used to connect a CLV to the Profibus-DP, DeviceNet, or to the Ethernet for use in industrial applications.
The BMS 20 Bus Connection Module enables the CLV to be integrated in the Interbus-S.

Connecting the CLV to the BMV 10/BMS 20

BMV 10: two cables no. 2 020 302 are required.
BMS 20: the cables no. 2 020 265 and no. 2 020 264 are required.

Alternatively, via external parameter memory no. 2 020 307 (see *Chapter 5.2.5 Connections/cables for the external parameter memory (connection to AMV/S or BMV 10/BMS 20)*.

a) CLV without heater:

Connection modules: BMV 10 and BMS 20.
The cables no. 2 020 302 can be extended to 10 m for CLVs without a heater (host and terminal interface: RS 232!).

b) CLV with heater:

Connection module: BMV 10.
The BMV 10 may only be used if it is mounted outside the refrigeration area (temperature range 0 ... +40 °C).

The cables no. 2 020 302 must **not** be extended. If longer cables are required, the entire power supply system (Pin 1/Pin 5) must be connected with a wire cross-section of at least 0.75 mm² at a maximum of 10 m.

Recommendation Use the cable no. 2 021 298 (with two connector covers, length 3 m).

The BMS 20 is not suitable for powering CLVs with heater!

The procedures for connecting and configuring the Bus Connection Modules are described in the following documentation:

- Operating Instructions for the "*BMV/BMH 10 for Profibus DP Bus Connection Module*" (no. 8 008 825)
- Operating Instructions for the "*BMV/BMH 10 for DeviceNet Connection Module*" (no. 8 008 972)
- Operating Instructions for the "*BMV/BMH 10 for Ethernet Connection Module*" (no. 8 009 398)
- Technical Information for the "*BMS 20 for Interbus-S Bus Connection Module*" (no. 8 007 546)

5.2.5 Connections/cables for the external parameter memory (connection to AMV/S or BMV 10/BMS 20)

The external parameter memory (external accessory) is located in a connector cover with 15-pin D Sub HD plug connections. The cover covers the terminals on the CLV so that the enclosure rating IP 65 is achieved.

The connector cover with the external parameter memory is prefabricated with two cables, each 3 m in length, and is available with four different cable ends:

- With two 15-pin D Sub HD connections (pin assignment identical to that of the CLV terminals), no. 2 020 307
- With a connector cover, no. 2 021 689

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- With two open cable ends, no. 2 020 981
- with one 9-pin D Sub cable connector and one open end, no. 2 020308

Connecting the CLV with external parameter memory

a) CLV without heater:

Connection Modules: AMV/S 60, AMV 30-071, BMV 10

➢ Cover the terminals on the CLV with the connector cover (parameter memory) no. 2 020 307. Connect the plug/socket on the cables ("Host/Term" and " I/O" connections) with the appropriate connections on the AMV/S or BMV 10.

Connection Module: BMS 20.

➢ Cover the terminals on the CLVs with the connector cover (parameter memory) no. 2 020 308. Connect the 9-pin plug ("Host/Term" connection) to the socket on the BMS 20. Connect the wires of the free cable end ("I/O" terminal) to the terminal strips in the BMS 20.

Recommendation Use the external parameter memory no. 2 020 981 (open cable ends) for connecting the device to non-Sick Power packs/wiring configurations.

b) CLV with heater:

Connection Module: AMV 100/200

➢ AMV 100: Cover the terminals on the CLV with the connector cover (parameter memory) no. 2 021 689, labeled "SCANNER". Connect the other connector covers, labeled "HOST", to the corresponding connections on the AMV 100.

➢ AMV 200: see AMV 100, proceed in the same way with the second CLV.

5.2.6 Connections/cables for the IP 65 connector cover (connection to AMV 100/200 or BMV 10)

The connector cover (optional accessory) with 15-pin D Sub HD plug connections is used to cover the terminals on the CLV so that the enclosure rating IP 65 is provided.

The connector cover is prefabricated with two cables, each of 3 m in length, and is available with two different cable ends:

- With one additional connector cover at the other end (pins assignment identical to that of the CLV terminals), no. 2 021 298
- With two open cable ends, no. 2 021 267

CLV with heater:

Both connector cover variants can be used with temperatures up to max. –50 °C if the CLV is stationary and the cables are not moved. If the cables are moved due to changes in the position of the CLV, the temperature must not drop below max. –40 °C.

Recommendation Use the external parameter memory no. 2 020 267 (open cable ends) for connecting the device to non-Sick Power packs/wiring configurations.

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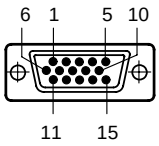
5.3 Connector pin assignment

5.3.1 Terminals on the CLV

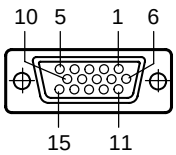
Device plug: "Host/Term" connection



Pin	Signal	Function
1[1)]	V_S	Supply voltage
2	RxD (RS 232), Terminal	Terminal interface (receiver)
3	TxD (RS 232), Terminal	Terminal interface (transmitter)
4	Term (RS 422/485)	Termination host interface
5	GND	Ground
6	RD+ (RS 422/485), Host	Host interface (receiver+)
7	RD– (RS 422/485), Host RxD (RS 232), Host	Host interface (receiver–)
8	TD+ (RS 422/485), Host	Host interface (transmitter+)
9	TD– (RS 422/485), Host TxD (RS 232), Host	Host interface (transmitter–)
10	CAN H	CAN Bus (IN/OUT)
11	Bus RT_485–	
12	Bus RT_485+	
13	Bus R_485–	
14	Bus R_485+	
15	CAN L	CAN Bus (IN/OUT)
Housing	–	Shield
1) Pin 1 is jumpered with Pin 1 of the "I/O" connection in the CLV		

Table 5-3: Pin assignment of the 15-pin D Sub HD "Host/Term" plug

Device socket: "I/O" connection



Pin	Signal	Function
1[1)]	V_S	Supply voltage
2	IN 1	Switching input (trigger for focus control)
3	Sensor	Switching input (external reading pulse)
4	Result 1	Switching output, variable function
5	GND	Ground
6	IN 0	Switching input (trigger for focus control)
7	IN 2	Switching input (trigger for focus control)
8	Result 2	Switching output, variable function
9	INGND	Common ground for all inputs
10	Result 3	Switching output, variable function
11	IN 3	Switching input, variable function
12	IN 4	Switching input, variable function
13	I2C SDA	I2C Bus (for external parameter memory)
14	I2C SCL	I2C Bus (for external parameter memory)
15	Result 4	Switching output, variable function
Housing	–	Shield
1) Pin 1 is jumpered with Pin 1 of the "Host/Term" connection in the CLV		

Table 5-4: Pin assignment of the 15-pin D Sub HD "I/O" socket

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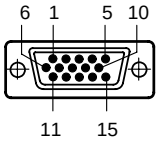
5.3.2 External parameter memory no. 2 020 307/2 021 689 (optional accessory) connector cover no. 2 021 298 (optional accessory)

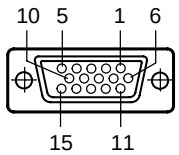
Cable plug: "Host/Term" connection



Pin	Signal	Function
1[1)]	V_S	Supply voltage
2	RxD (RS 232), Terminal	Terminal interface (receiver)
3	TxD (RS 232), Terminal	Terminal interface (transmitter)
4	Term (RS 422/485)	Termination host interface
5	GND	Ground
6	RD+ (RS 422/485), Host	Host interface (receiver+)
7	RD– (RS 422/485), Host RxD (RS 232), Host	Host interface (receiver–)
8	TD+ (RS 422/485), Host	Host interface (transmitter+)
9	TD– (RS 422/485), Host TxD (RS 232), Host	Host interface (transmitter–)
10	CAN H	CAN bus (IN/OUT)
11	Bus RT_485–	
12	Bus RT_485+	
13	Bus R_485–	
14	Bus R_485+	
15	CAN L	CAN bus (IN/OUT)
Housing	–	Shield
1) Pin 1 is jumpered with Pin 1 of the "I/O" connection in the CLV		

Table 5-5: Pin assignment of the 15-pin D Sub HD "Host/Term" cable plug

Cable socket: "I/O" connection



Pin	Signal	Function
1[1)]	V_S	Supply voltage
2	IN 1	Switching input (trigger for focus control)
3	Sensor	Switching input (external reading pulse)
4	Result 1	Switching output, variable function
5	GND	Ground
6	IN 0	Switching input (trigger for focus control)
7	IN 2	Switching input (trigger for focus control)
8	Result 2	Switching output, variable function
9	INGND	Common ground for all inputs
10	Result 3	Switching output, variable function
11	IN 3	Switching input, variable function
12	IN 4	Switching input, variable function
13	I2C SDA	I2C Bus (for external parameter memory)
14	I2C SCL	I2C Bus (for external parameter memory)
15	Result 4	Switching output, variable function
Housing	–	Shield
1) Pin 1 is jumpered with Pin 1 of the Host/Term connection in the CLV		

Table 5-6: Pin assignment of the 15-pin D Sub HD "I/O" cable socket

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5.4 Preparations for electrical installation

5.4.1 Requirements for the host interface

The host interface of the CLV can be operated as an RS 422/485 or an RS 232 interface. *Table 5-7* shows the recommended maximum cable lengths as a function of the selected data transfer rate.

Interface type	Transfer rate	Distance from host
RS 232	Up to 19 200 bit/s 38 400...57 600 bit/s	Max. 10 m Max. 3 m
RS 422/485[1)]	Max. 38 400 bit/s Max. 57 600 bit/s	Max. 1 200 m Max. 500 m
1) with suitable line termination		

Table 5-7: Maximum cable lengths between the CLV and host

➢ To prevent interference, do not lay the cables parallel with power supply and motor cables over long distances, e. g. in cable ducts.

5.4.2 Supply voltage

The CLV requires a supply voltage of 18 ... 30 V DC for operation without a heater and 24 V DC +20 %/–10 % for operation with a heater, to IEC 742 (functional extra-low voltage). The power consumption of the individual types is as follows:

Type	Voltage	Scanning method	Heater	Power consumption[1)]	Connection module
CLV 490-0010/-2010/-6010	18 ... 30 V DC	Line scanner	No	9 W (typ.)/max. 16 W	AMV/S 60 or
CLV 490-1010/-3010/-7010	18 ... 30 V DC	Line scanner with oscillating mirror	No	9 W (typ.)/max. 18 W	AMV 30-071 or BMV/BMH 10 or BMS 20
CLV 490-0011/-2011/-6011	24 V DC	Line scanner	Yes	75 W (typ.)/max. 90 W	AMV 100/200
CLV 490-1011/-3011/-7011	+20 %/–10 %	Line scanner with oscillating mirror	Yes	75 W (typ.)/max. 100 W	
1) switching outputs not connected					

Table 5-8: Power consumption of the CLV

Power-up delay

The selected device number (default: 1) affects the power-up delay of the device. This is useful if a large number of CLVs (e. g. in the SICK network) are to be supplied from one power source. *Table 5-9* contains a list of the available intervals.

Device number GN	Power-up delay	Device number GN	Power-up delay
1; 11; 21; 31	0 ms	6; 16; 26	2 000 ms
2; 12; 22	400 ms	7; 17; 27	2 400 ms
3; 13; 23	800 ms	8; 18; 28	2 800 ms
4; 14; 24	1 200 ms	9; 19; 29	3 200 ms
5; 15; 25	1 600 ms	10; 20; 30	3 600 ms

Table 5-9: Power-up delay as a function of the device number GN

Tip The device number can be selected on the DEVICE CONFIGURATION tab in the "CLV-Setup" program.

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5.4.3 Non-SICK Power supply unit/connections without the Connection Module

Power output

If an non-Sick Power supply unit is used instead of the AMS 60, it must be capable of providing the following voltage and power values:

- For CLV without heater: 18 ... 30 V DC, min. 20 W continuous power output
- For CLV with heater: 24 V DC +20 %/–10 %, min. 100 W

The non-Sick Power supply unit must comply with IEC 742 (functional extra-low voltage). **The output circuit must be reliably electrically isolated from the input circuit pursuant to IEC 742 by means of double insulation and a safety isolating transformer.**

Wire cross-section

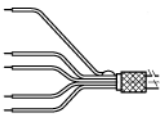
The wire cross-section for the power supply (Pin 1/Pin 5) should be at least 0.15 mm², or 0.75 mm² for CLVs with heater, with a max. length of 10 m.

a) Connecting the CLV without a connector cover/external parameter memory

The two cables no. 2 020 303 and no. 2 020 264 with open cable end on one side are required to connect the CLV. The wire color assignments are shown in *Table 5-10* and *Table 5-11, Page 5-10*. The cables must not be extended for CLVs with heater.

Connection cable no. 2 020 203 ("Host/Term" connection)

15-pin D Sub HD socket and open cable end



Pin	Signal	Wire color
1[1)]	V_S	Red
2	RxD (RS 232), Terminal	White
3	TxD (RS 232), Terminal	Brown
4	Term (RS 422/485)	Violet
5	GND	Blue
6	RD+ (RS 422/485), Host	Green
7	RD– (RS 422/485), Host RxD (RS 232), Host	Yellow
8	TD+ (RS 422/485), Host	Grey
9	TD– (RS 422/485), Host TxD (RS 232), Host	Pink
10	CAN H	–
11	Bus RT_485–	–
12	Bus RT_485+	–
13	Bus R_485–	–
14	Bus R_485+	–
15	CAN L	–
–	Shield	Orange
1) Pin 1 is jumpered with Pin 1 of the "I/O" connection in the CLV		

Table 5-10: Wire color assignment of the cable no. 2 020 303

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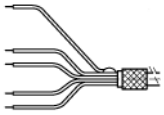
Connection cable no. 2 020 264 ("I/O" connection)

15-pin D Sub HD plug and open cable end



Pin	Signal	Wire color
1[1)]	V_S	Red
2	IN 1	White
3	Sensor	Brown
4	Result 1	Violet
5	GND	Blue
6	IN 0	Green
7	IN 2	Yellow
8	Result 2	Grey
9	INGND	Black
10	Result 3	Grey-pink
11	IN 3	Red-blue
12	IN 4	White-green
13	I2C SDA	Brown-green
14	I2C SCL	White-yellow
15	Result 4	Yellow-brown
–	Shield	Orange
1) Pin 1 is jumpered with Pin 1 of the "Host/Term" connection in the CLV		

Table 5-11: Wire color assignment of the cable no. 2 020 264

b) Connecting the CLV with external parameter memory no. 2 020 981

CLV without heater:

➢ Cover the "Host/Term" and "I/O" connections on the CLV with the connector cover (parameter memory) no. 2 020 981. Connect the free cable ends accordingly. The wire color assignments are shown in *Table 5-12* and *Table 5-13*.

CLV with heater:

Available on request.

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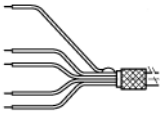
Cable 1 ("Host/Term" connection)

15-pin D Sub HD socket in the connector cover and open cable end

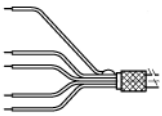


Pin	Signal	Wire color
1 [1)]	V_S	Red and pink
2	RxD (RS 232), Terminal	White
3	TxD (RS 232), Terminal	Brown
4	Term (RS 422/485)	Violet
5	GND	Blue and grey-brown
6	RD+ (RS 422/485), Host	Green
7	RD– (RS 422/485), Host RxD (RS 232), Host	Yellow
8	TD+ (RS 422/485), Host	Grey
9	TD (RS 422/485), Host TxD (RS 232), Host	Black
10	CAN H	Grey-pink
11	Bus RT_485–	Red-blue
12	Bus RT_485+	White-green
13	Bus R_485–	Brown-green
14	Bus R_485+	White-yellow
15	CAN L	Yellow-brown
–	Shield	Orange
1) Pin 1 is jumpered with Pin 1 of the "I/O" connection in the CLV		

Table 5-12: Wire color assignment of cable 1 for external parameter memory no. 2 020 981

Cable 2 ("I/O" connection)

15-pin D Sub HD plug in the connector cover and open cable end



Pin	Signal	Wire color
1 [1)]	V_S	Red and pink
2	IN 1	White
3	Sensor	Brown
4	Result 1	Violet
5	GND	Blue and grey-brown
6	IN 0	Green
7	IN 2	Yellow
8	Result 2	Grey
9	INGND	Black
10	Result 3	Grey-pink
11	IN 3	Red-blue
12	IN 4	White-green
13	I2C SDA	–
14	I2C SCL	–
15	Result 4	Yellow-brown
–	Shield	Orange
1) Pin 1 is jumpered with Pin 1 of the "Host/Term" connection in the CLV		

Table 5-13: Wire color assignment of cable 2 for external parameter memory no. 2 020 981

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c) Connections with connector cover no. 2 021 267

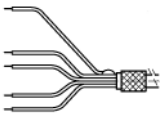
➢ Cover the "Host/Term" and "I/O" connections on the CLV with the connector cover no. 2 020 267 and connect the free cable ends accordingly. The wire color assignments are shown in *Table 5-14* and *Table 5-15*.

CLV with heater:

The connector cover can be used with temperatures up to max. –50 °C if the CLV is stationary and the cables are not moved. If the cables are moved due to changes in the position of the CLV, the temperature must not drop below max. –40 °C.

Cable 1 (power supply)

15-pin D Sub HD socket in the connector cover and open cable end

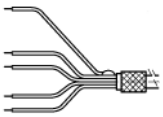


Pin	Connector cover	Signal	Wire color
1	Socket	V_S	Red
5	Socket	GND	Black

Table 5-14: Wire color assignment cable 1 for connector cover no. 2 021 267

Cable 2 (data and function interfaces)

15-pin D Sub HD socket/plug in the connector cover and open cable end



Pin	Connector cover	Signal	Wire color
2	Plug	IN 1	White
3	Plug	Sensor	Brown
4	Plug	Result 1	Green
6	Plug	IN 0	Yellow
7	Plug	IN 2	Grey
8	Plug	Result 2	Pink
9	Plug	INGND	Blue
10	Plug	Result 3	Red
11	Plug	IN 3	Black
12	Plug	IN 4	Violet
15	Plug	Result 4	Grey-pink
2	Socket	RxD (RS 232), Terminal	Red-blue
3	Socket	TxD (RS 232), Terminal	White-green
4	Socket	Term (RS 422/485)	Brown-green
6	Socket	RD+ (RS 422/485), Host	White-yellow
7	Socket	RD– (RS 422/485), Host RxD (RS 232), Host	Yellow-brown
8	Socket	TD+ (RS 422/485), Host	White-grey
9	Socket	TD– (RS 422/485), Host TxD (RS 232), Host	Grey-brown
–	–	Shield	Orange

Table 5-15: Wire color assignment cable 2 for connector cover no. 2 021 267

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5.5 Electrical installation procedure

5.5.1 Individual steps

- Connect the power supply
- Connect the host interface
- Connect the PC (connect the terminal interface)
- Connect the "Sensor" and "IN 0 ... IN 4" switching inputs
- Connect the "Result 1 ... Result 4" switching outputs

5.5.2 Tools

- Tool
- Digital measuring device (current/voltage measurement)

5.5.3 Connecting the supply voltage

a) SICK AMV/S and BMV 10 Connection Modules

If the CLV is powered via the SICK Connection Modules, the supply voltage does not have to be wired separately.

Connecting the CLV without external parameter memory:

1. Make sure that the power supply to the Connection Module is switched off.
2. Connect the "Host/Term" and "I/O" connections on the CLV to the corresponding connections on the Connection Module using two cables no. 2 020 302 and secure them tightly on both sides.

Connecting the CLV with external parameter memory:

1. Mount the connector cover with the external parameter memory no. 2 020 307 on the "Host/Term" and "I/O" connections of the CLV and screw it tightly into position.
2. Connect the two free plug connections on the cables to the corresponding connections on the Connection Module and secure them tightly.

The data and function interfaces of the CLV are connected to the Connection Module.

b) Power supply via non-SICK Power pack

Connecting the CLV without external parameter memory:

1. Connect the cable socket on cable no. 2 020 303 on the "Host/Term" connection and screw it tightly into position.
2. Connect the cable plug on the cable no. 2 020 264 to the "I/O" connection and screw it tightly into position.
3. Connect the power supply to the red wire (Pin 1, V_S) and blue wire (Pin 5, GND) on cable no. 2 020 303. *See also* *Table 5-10, Page 5-9*

Connecting the CLV with external parameter memory:

1. Connect the "Host/Term" and "I/O" connections on the CLV to the corresponding connections on the Connection Module using two cables no. 2 020 981 and secure them tightly on both sides.
2. Connect the power supply to the red/pink wire (Pin 1, VS) and the blue/grey-brown wire (Pin 5, GND) of cable 1. See also *Table 5-12, Page 5-11*.

The CLV is connected to the supply voltage.

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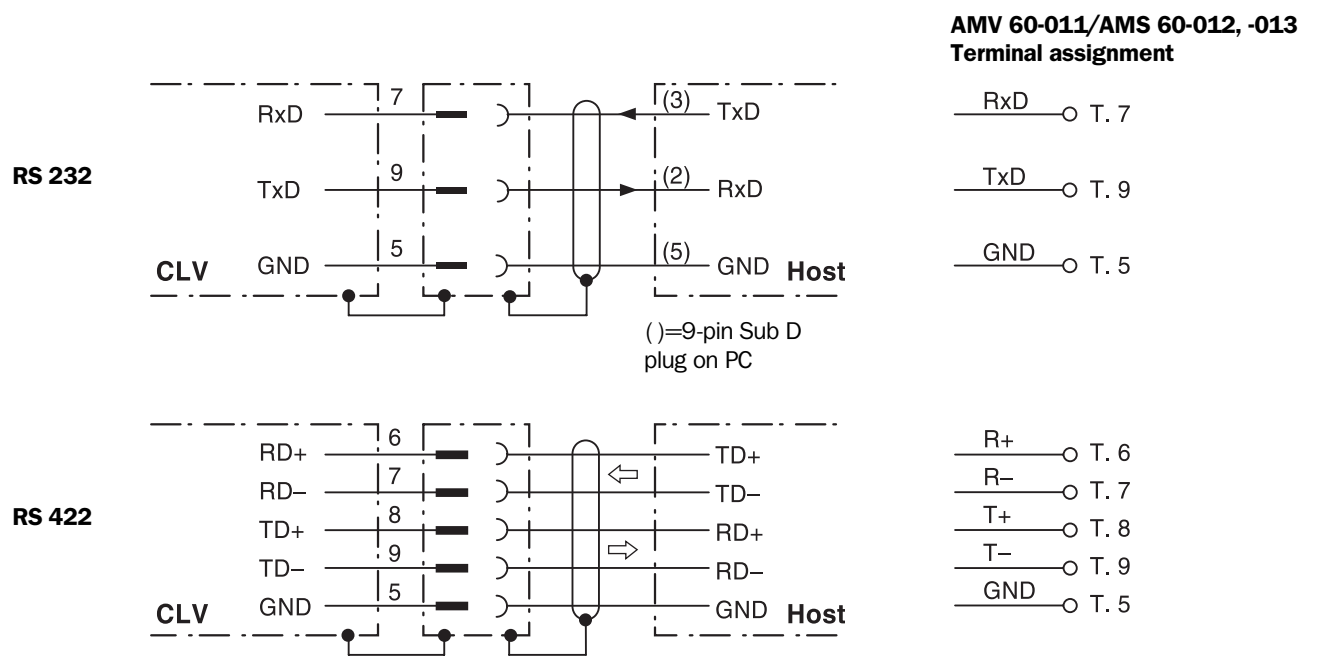
5.5.4 Connecting the host interface



RS 485: Connection diagram for SICK network available on request
CAN-Network: See Operating instructions "*Using the CAN interface*"

Fig. 5-2: Connecting the host interface

CAUTION

Risk of damage to the interface module!

Electrical components in the CLV may be damaged if the host interface is connected incorrectly. This also applies when the host interface connections are changed in the Connection Modules (configuration).

- ➢ Connect the host interface as shown in *Fig. 5-2*.
- ➢ Check the connections carefully before you switch on the CLV.

1. Connect the host interface on the CLV to the host using shielded cables (EMC requirements). Ensure that the maximum cable lengths are not exceeded (see *Table 5-7, Page 5-8*).

Recommendation

2. Apply the shield on one side.

Default In the default setting, the CLV communicates with the host via the host interface using the values shown in *Table 5-16*.

Parameter	Value
Physical design	RS 422/485
Data transfer rate	9 600 bit/s
Data bits	8
Parity	None
Stop bits	1
Protocol	SICK (start character: STX, stop character: ETX, no request for repeat: none, timeout: 50 ms)

Table 5-16: Communication parameters for the host interface (default setting)

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For connecting the host interface via the AMV/S 60 Connection Module, see the Operating Instructions for the "*AMV/S 60 Connection Module*" (no. 8 008 296).

Terminating the RS 422 interface

The interface can be terminated in the Connection Module. See "*Operating Instructions for the AMV/S 60, AMV 30.071, AMV 100/200*", or "*BMS 20 Connection Modules*".

Activating the RS 232 interface:

The RS 232 interface can be activated with the "CLV-Setup" program:

1. Choose the HOST INTERFACE tab.
2. Choose the RS 232 option from the HARDWARE drop-down list under DATA FORMAT.
3. Download the data to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
4. Confirm the dialog box by choosing PERMANENT.
   The CLV uses the RS 232 version of the host interface.

Tip The communication parameters can be changed, if necessary, on the HOST INTERFACE tab. To do so, change the values under DATA FORMAT and INTERFACE PROTOCOL.

5.5.5 Connecting the CAN interface

Instructions for the connection and for configuration of the CLV to use the device in the SICK-specific CAN Scanner Network or in a CANopen network see the Operating Instructions *"Application of the CAN interface"* (no. 8 009 180, English edition).

5.5.6 Connecting the PC

The CLV is operated and configured with the PC-based "CLV-Setup" program. In order to do so, you must connect the device to the PC via the terminal interface (auxiliary interface). Unlike the host interface, the terminal interface has a permanent data format and a fixed data transfer rate. *Fig. 5-3* shows how the terminal interface is connected. The cable length should not be more than 10 m.

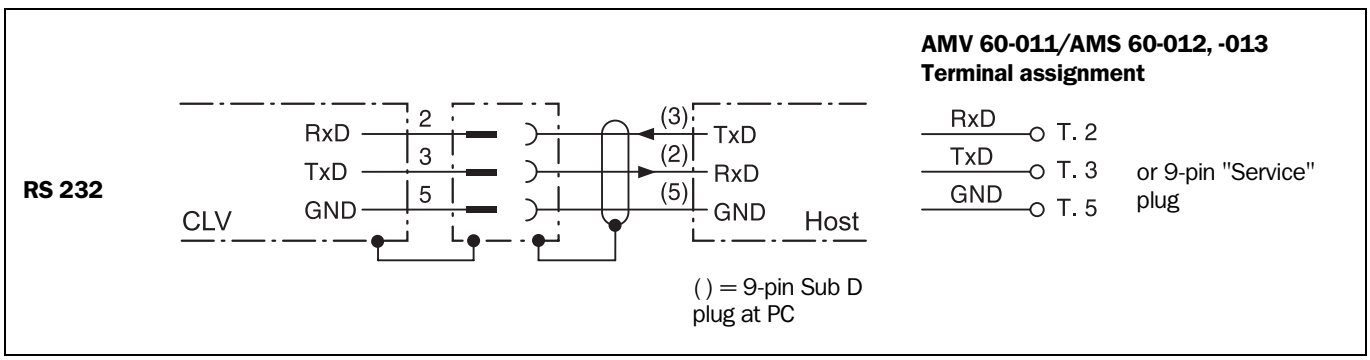

Fig. 5-3: Connecting the terminal interface

1. Switch off the PC and power supply to the SICK Connection Module.
2. Connect the PC to the internal, 9-pin "Service" plug on the Connection Module using an RS 232 connecting cable, e. g. no. 2 014 054 (RxD and TxD crossed).

   – or –

   Without the SICK Connection Module:
   Connect the PC as shown in *Fig. 5-3*.
3. Switch on the PC and power supply to the SICK Connection Module.

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4. Set the communication parameters (see *Chapter 10.6.3 Starting CLV-Setup, Page 10-43*).

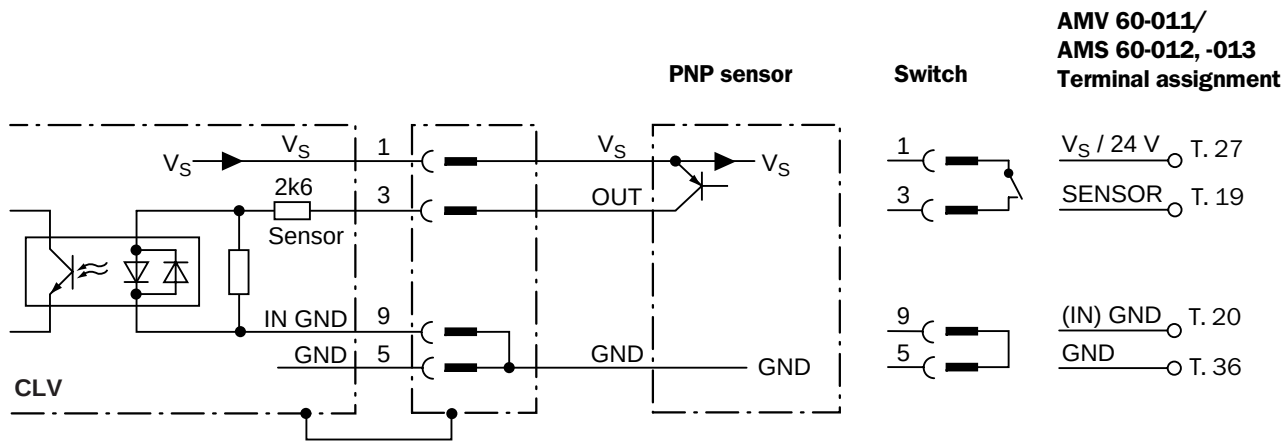
Tip In the default configuration, the terminal interface outputs the reading result in reading diagnosis mode.

You can change the operating mode to MONITOR HOST INTERFACE, to MONITOR HOST INTERFACE 2 or AUXILIARY INPUT on the AUXILARY INTERFACE tab in the "CLV-Setup" program.

5.5.7 Connecting the switching inputs

"Sensor" switching input

If a reading procedure is to be triggered on the CLV by an external sensor, the reading pulse sensor must be connected to the "Sensor" switching input. This trigger type is selected in the default setting of the CLV. *Fig. 5-4* shows the connections for the "Sensor" switching input. *Table 5-17* contains the characteristic data for this input.



V_S = +18 ... +30 V DC for CLV without heater, 24 V DC +20 % /–10 % for CLV with heater

Fig. 5-4: Connections of the "Sensor" switching input

➢ Connect the reading pulse sensor as shown in *Fig. 5-4*.

Switching mode	Current at the input starts the reading interval on the CLV. (default: active high, debouncing: max. 30 ms (standard))
Properties	– optodecoupled, non-interchangeable – can be connected to PNP output on a sensor
Electrical values	Low: –30 V ≤ V_I ≤ +2 V High: +7 V ≤ V_I ≤ +13 V

Table 5-17: Characteristic data of the "Sensor" switching input

Tip You can change the switching mode (polarity, debouncing, response for first pulse after power-up) of the "SENSOR" switching input on the DEVICE CONFIGURATION tab in the "CLV-Setup" program.

➢ Click the EDIT READING TRIGGER button.
Enter the values in the dialog box displayed.

For connecting the host interface via the AMV/S 60 Connection Module, see the Operating Instructions for the "*AMV/S 60 Connection Module*" (no. 8 008 296).

Note An external pulse is not required for Percentage Evaluation mode.

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"IN 0 ... IN 4" switching inputs

If the Autofocus function is not used and the CLVs dynamic focus control function is to be triggered by external sensors, the sensors are connected to the five inputs "IN 0 ... IN 4". Together with the internal assignment table, these can be used to configure a maximum of 32 switching states for up to 8 distance configurations. The dynamic focus control function is selected for all inputs by default.

Additional function "IN 3":

The "IN 3" input can also be used as a trigger source for the One-Shot function of the oscillating mirror.

Additional function "IN 4":

The input "IN 4" can also be used as a trigger source for the One-Shot function of the oscillating mirror or as an input for a belt increment signal. In this case, a maximum of 16 switching statuses can be used for dynamic focus control.

Fig. 5-5 shows the connections for the "IN 0 ... IN 4" switching inputs. *Table 5-18* shows the pin assignment on the CLV and the terminal assignment in the AMV/S 60. *Table 5-19, Page 5-18* contains the characteristic data for these inputs. *Table 5-20, Page 5-18* shows the input combinations based on the distance configurations. The interaction of the switching input functions is shown in *Table 5-21, Page 5-19*

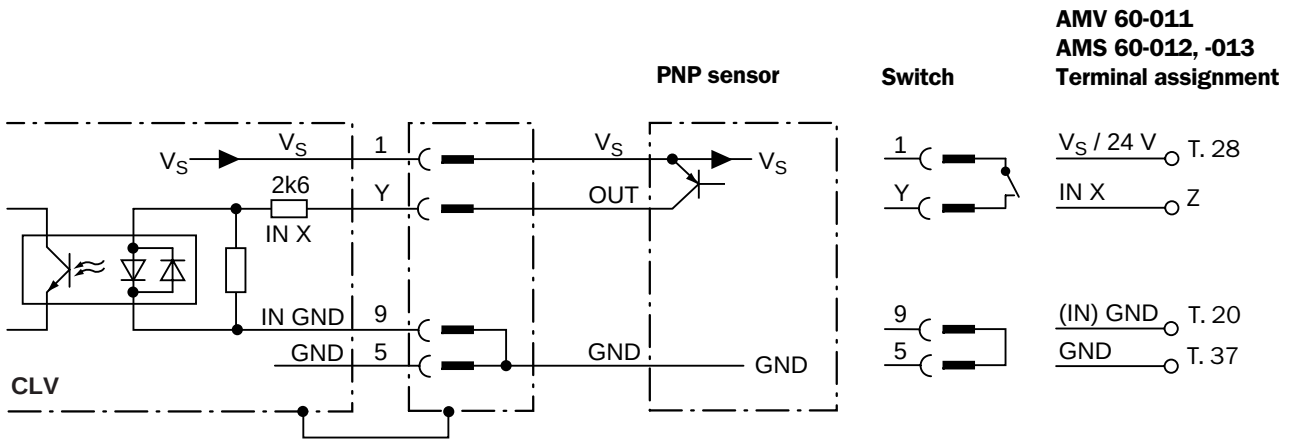

Fig. 5-5: Connections of the "IN 0 ... IN 4" switching inputs

Input "IN X"	CLV "I/O" connection Pin Y	AMV/S 60 Terminal Z
IN 0	Pin 6	T. 22
IN 1	Pin 2	T. 23
IN 2	Pin 7	T. 24
IN 3	Pin 11	T. 25
IN 4	Pin 12	T. 26

Table 5-18: Pin and terminal assignment for "IN 0 ... IN 4" switching inputs

➢ Connect the sensors as shown in *Fig. 5-5*.

For connecting the host interface via the AMV/S 60 Connection Module, see the Operating Instructions for the "*AMV/S 60 Connection Module*" (no. 8 008 296).

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Function	Trigger source for dynamic focus control "IN 3" alternative: – trigger source for One Shot on oscillating mirror "IN 4" alternative: – trigger source for One Shot on oscillating mirror – belt increment input Default setting "IN 3" and "IN 4": dynamic focus control
Switching mode	Active when input energized (high)
Properties	– Optodecoupled, non-interchangeable – Can be connected to PNP output on a sensor
Electrical values	Low: $-30\ V \leq V_I \leq +2\ V$ High: $+7\ V \leq V_I \leq +13\ V$

Table 5-19: Characteristic data of the "IN 0 ... N 4" switching inputs

Switching inputs		**Content Assignment Table Distance Config.[2]**	
Logic state[1] "IN 4 ... IN 0" inputs	**Assignment table index**	**Default setting**	**Example: Photoelectric switches (bright switching)**
0 0 0 0 0	N 1	DC 1	DC 6
0 0 0 0 1	N 2	DC 2	DC 5
0 0 0 1 0	N 3	DC 3	DC 4
0 0 0 1 1	N 4	DC 4	DC 4
0 0 1 0 0	N 5	DC 5	DC 3
0 0 1 0 1	N 6	DC 6	DC 3
0 0 1 1 0	N 7	DC 7	DC 3
0 0 1 1 1	N 8	DC 8	DC 3
0 1 0 0 0	N 9	DC 8	DC 2
0 1 0 0 1	N 10	DC 8	DC 2
0 1 0 1 0	N 11	DC 8	DC 2
0 1 0 1 1	N 12	DC 8	DC 2
0 1 1 0 0	N 13	DC 8	DC 2
0 1 1 0 1	N 14	DC 8	DC 2
0 1 1 1 0	N 15	DC 8	DC 2
0 1 1 1 1	N 16	DC 8	DC 2
1 0 0 0 0	N 17	DC 8	DC 1
1 0 0 0 1	N 18	DC 8	DC 1
1 0 0 1 0	N 19	DC 8	DC 1
1 0 0 1 1	N 20	DC 8	DC 1
1 0 1 0 0	N 21	DC 8	DC 1
1 0 1 0 1	N 22	DC 8	DC 1
1 0 1 1 0	N 23	DC 8	DC 1
1 0 1 1 1	N 24	DC 8	DC 1
1 1 0 0 0	N 25	DC 8	DC 1
1 1 0 0 1	N 26	DC 8	DC 1
1 1 0 1 0	N 27	DC 8	DC 1
1 1 0 1 1	N 28	DC 8	DC 1
1 1 1 0 0	N 29	DC 8	DC 1
1 1 1 0 1	N 30	DC 8	DC 1
1 1 1 1 0	N 31	DC 8	DC 1
1 1 1 1 1	N 32	DC 8	DC 1

1) 1 = energized (active); 0 = deenergized (inactive)

2) Distance configuration (DC): data record for focus position

Table 5-20: Dynamic focus control: switching inputs/distance configuration assignment table

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Parameter settings of switching inputs		**Effects**
"IN 3"	**"IN 4"**	
Focus control[1)]	Focus control[1)]	"IN 3" switches the focus position in combination with "IN 0 ... IN 2" and "IN 4"
Focus control[1)]	One shot	"IN 4" triggers the one shot "IN 3" switches the focus position in combination with "IN 0 ... IN 2"
Focus control[1)]	Increment counter	"IN 4" receives increment signals "IN 3" switches the focus position in combination with "IN 0 ... IN 2"
One shot	Focus control[1)]	"IN 3" triggers the one shot "IN 0 ... IN 2" switch the focus position "IN 4" has no effect
One shot	One shot	"IN 4" triggers the one shot "IN 0 ... IN 2" switch the focus position "IN 3" has no effect
One shot	Increment counter	"IN 3" triggers the one shot "IN 4" receives increment signals "IN 0 ... IN 2" switch the focus position
1) depending on the assignment table		

Table 5-21: Combination of the functions of the "IN 0 ... IN 4" switching inputs

Tip The function assigned to the "IN 3" and "IN 4" input can be modified on the DEVICE CONFIGURATION tab in the "CLV-Setup" program.

➢ Click the FUNCTION IN 3 and FUNCTION IN 4 drop-down list and choose the required function.

5.5.8 Connecting the "Result 1 Result 4" switching outputs

The four switching outputs can be assigned different functions for outputting result statuses independently of each other. If the assigned event occurs during the reading procedure, the corresponding switching output becomes live at the end of the reading pulse for the selected pulse duration. The pulse duration can be set individually for each output.

The "Read Result" LED is linked to the "Result 2" output and lights up in Reading mode for the selected pulse duration and function of the result status display (default: Good Read, 100 ms).

Fig. 5-6, Page 5-20 shows the connections for the "Result 1 ... Result 4" switching outputs. *Table 5-22, Page 5-20* shows the pin assignment on the CLV and the terminal assignment in the AMV/S 60. *Table 5-23, Page 5-20* contains the characteristic data for these outputs. The four outputs have the same characteristic data.

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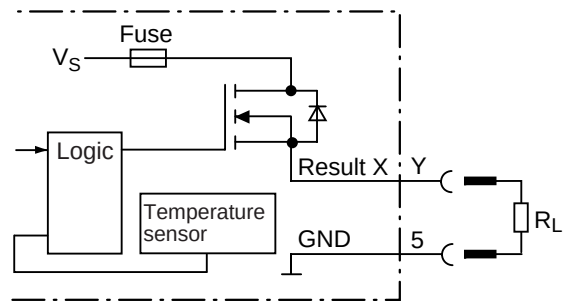

AMV 60-011/
AMS 60-012, -013
Terminal assignment

Result X — Z
GND — T.35

Pulse duration depending on setting:
- 10 ms ... 900 ms
- 100 ms ... 9 900 ms
- 00: static (to the end of next reading pulse)

V_S= +18 ... +30 V DC for CLV without heater,
24 V DC +20 %/–10 % for CLV with heater

Pin and terminal assignment for "**Result X**" see *Table 5-22*

Fig. 5-6: Connections of the "Result 1 ... Result 4" switching outputs

Output "Result X"	**CLV "I/O" connection Pin Y**	**AMV/S 60 Terminal Z**
Result 1	Pin 4	T. 31
Result 2	Pin 8	T. 32
Result 3	Pin 10	T. 33
Result 4	Pin 15	T. 34

Table 5-22: Pin and terminal assignment for "Result 1 ... Result 4" switching outputs

➢ Connect the outputs as shown in *Fig. 5-6*.

Switching mode	PNP-switching with respect to the supply voltage V_S
Properties	The current in the event of a short-circuit is limited to 0.7 A
Function assignment (default)	"Result 1": Device Ready (static), polarity: not inverted "Result 2": Good Ready, polarity: not inverted "Result 3": No Ready, polarity: not inverted "Result 4": Match 1, polarity: not inverted Pulse duration: 100 ms
Electrical values	$0 V \le V_0 \le 30 V$ Guaranteed: $V_0 \le V_S \le 1.3 V$ with $I_0 \le 100$ mA $I_0 \le 100$ mA

Table 5-23: Characteristic data of the "Result 1 ... Result 4" switching outputs

Note If the "Device Ready" function is chosen, the CLV outputs a static pulse in Reading mode.

For connecting the host interface via the AMV/S 60 Connection Module, see the Operating Instructions for the "*AMV/S 60 Connection Module*" (no. 8 008 296).

Tip The output function, pulse duration (timer), and polarity of the signals can be changed on the DEVICE CONFIGURATION tab in the "CLV-Setup" program.

➢ Click the EDIT RESULT OUTPUTS button and enter the values in the dialog box displayed.

Recommendation

➢ To check the switching functions using a high-impedance digital voltmeter, connect a load to the outputs to prevent incorrect voltage values/switching statuses from being displayed.

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6 Operation

6.1 Overview of steps for starting up the CLV

- Start up the CLV with the factory default settings (quick start).
  With this configuration, the CLV can be operated without being connected to a PC (this is, however, not the case the first time the CLV with external parameter memory is switched on).
- Connect the PC (see *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*) and install the "CLV-Setup" program (see *Chapter 10.6 Installing and operating the "CLV-Setup" program, Page 10-41*).
- Configure (parameterize) the CLV for the desired application with CLV-Setup or command strings.

6.2 Default settings

Table 6-1 and *Table 6-2, Page 6-2* contain an overview of the factory default settings for the CLV. The default parameters are such that the CLV can be put into operation either straight away or following a few minor adjustments. A PC does not need to be connected to start up the CLV with the default settings (this is, however, not the case the first time the CLV with external parameter memory is switched on).
The default settings are stored permanently both in the ROM of the CLV and in the CLV-Setup database. They can be loaded to the RAM of the CLV at any time and displayed in the tabs of the "CLV-Setup" program.

Displaying and printing out a complete set of default settings in CLV-Setup

1. To save the current settings in the parameter set:
   Choose FILE and SAVE AS, and enter a file name in the dialog box that appears. CLV-Setup saves the current settings in a configuration file with the extension "*.scl".
2. Click in the toolbar.
   CLV-Setup loads the default settings from its internal database and displays them in the tabs.
3. Click in the toolbar.
   The PRINT FILE dialog box is displayed.
4. If desired, a comment can be entered in the input field for the header of the printout. Confirm the entry with OK. The PRINT dialog box for configuring the printer then is displayed.
5. Make the appropriate entries in the dialog box and confirm these with OK.

CLV-Setup prints out the complete set of default settings in the form of a table. The header contains the company and user names that were entered during the CLV-Setup installation routine.

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6.2.1 Default settings of the line scanner CLV 490 (all variants)

Parameter	Default setting
Decoder	SMART/standard
Active codes types	Code 39, 2/5 Interleaved, Code 128
Code length	Freely assignable (2/5 Interleaved: interval 4 ... 50 characters)
Start/stop ratio	Automatic
Min./max. code position	5/ 95 CP
No. of multiple reads	3
Min./max. no. codes	1
Scanning frequency	800 Hz
Distance measurement	Active
Autofocus mode	Min. distance
Range	400 ... 2 200 mm
Scan angle	–27°... +27°
Focus control trigger	Autofocus, switchover immediately (synchronously)
Reading pulse source	Start: "Sensor" switching input (active: high); end: "Sensor" switching input
"IN 0... IN 4" switching inputs	Focus position changeover (without meaning for autofocus function)
"Sensor" switching input	Start and end of reading pulse (level: active high), debouncing 20 ... 30 ms
Switching outputs	Not inverted; pulse duration: 100 ms
Status output function	Result 1: Device Ready (static); Result 2: Good Read; Result 3: No Read; Result 4: Match 1
CLV arrangement	Stand-alone
Read result output	Host interface
Device number	1
Start option	Load the parameter set of the external parameter memory
Host interface (type)	RS 422/485
Protocol	NAK; start character: STX, stop character: ETX
Transmission rate	9 600 bit/s
Data format	8 data bits, no parity, 1 stop bit
Output format	Header: blank, Separator: ST, Terminator: CR LF; Error string: separator only
Output sorting	In accordance with code position
Output time	Read result: end of the read interval Separator: after code
Test string	Not activated
Terminal interface	RS 232, 9 600 bit/s, 8 data bits, no parity, 1 stop bit (values cannot be changed)
Function	Reading diagnosis

Table 6-1: Extract: Default parameter settings of the line scanner CLV 490-0010/-0011

6.2.2 Default settings of the line scanner with oscillating mirror CLV 490 (all variants)

Default settings as for line scanner CLV 490, but with the following additional parameters:

Parameter	Default setting
Oscillating amplitude	±40 CW (corresponds to an angle of deflection of –20° ... +20°)
Operating mode	Oscillating with fixed amplitude, mode independent of reading pulse trigger
Oscillating frequency	1 Hz
Fixed position	50 CW (corresponds to an angle of deflection of 105°)

Table 6-2: Extract: Default parameter settings of the line scanner with oscillating mirror CLV 490

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6.3 Quick start

A PC does not need to be connected when the CLV is operated with the factory default settings (this is, however, not the case the first time the CLV with external parameter memory is switched on, see *Chapter 6.3.2 Switching the CLV with external parameter memory connected on for the first time with the factory default settings, Page 6-4*).

6.3.1 Switching the CLV on for the first time with the factory default settings

1. Connect the CLV to the AMV/S 60 Connection Module using the two cables no. 2 020 302.
2. Connect the reading pulse sensor (e. g. photoelectric reflex switch) to the "Sensor" switching input of the CLV via the AMV/S 60 (see *Chapter 5.5.7 Connecting the switching inputs, Page 5-16*).
3. Switch on the power supply of the AMV/S 60.
   The CLV starts. The "Device Ready" LED lights up. The "Result 1" ("Device Ready") output switches.

   CLV with external parameter memory connected:
   If an external parameter memory is connected to the CLV, the "Device Ready" LED blinks for 10 s when the device starts up correctly and then lights up constantly. If the "Device Ready" and "Read Result" LEDs both blink constantly, the memory is empty and the CLV is not ready for operation.
   In this case, proceed as described in *Chapter 6.3.2 Switching the CLV with external parameter memory connected on for the first time with the factory default settings, Page 6-4*.

   Line scanner with oscillating mirror:
   In the default setting, the CLV deflects the scan line around the position CW = 50 with a frequency of 1 Hz and an oscillating amplitude of ±20° (±40 CW). 50 CW correspond to a deflection angle below 105°.
4. Start the reading pulse: block the light path of the photoelectric switch or close the switch. The "Laser On" LED lights up. The CLV switches the laser diode on and the scan line appears.
5. Present the bar code pattern (*Fig. 6-1*) to the CLV at the reading distance specified in *Table 6-3, Page 6-4*.
6. Align the bar code in such a way that the red scan line is almost at a 90 angle to the bars (line scanner) or that the red scan line sweeps the bars at a 90 angle when it is deflected (oscillating mirror).
7. End the reading pulse: unblock the light path of the photoelectric switch or open the switch. The "Laser On" LED is extinguished. The CLV switches the laser diode off. The CLV confirms that the bar code was read successfully (the "Read Result" LED lights up for 100 ms). The "Result 2" ("Good Read") output is switched for a duration of 100 ms.

The CLV can now be operated with the factory default settings. The device can be switched off without the configuration data being lost as no changes have been made to the parameter set.

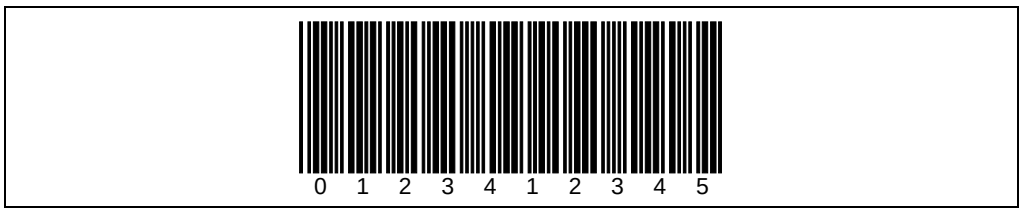

Fig. 6-1: Bar code pattern (Code 39; module width 0.35 mm; Print ratio 2:1)

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Device type	Scanning method	Reading distance
CLV 490 (all variants)	Line scanner	approx. 1 000 mm
CLV 490 (all variants)	Line scanner with oscillating mirror	approx. 1 000 mm

Table 6-3: Reading distances for default settings

6.3.2 Switching the CLV with external parameter memory connected on for the first time with the factory default settings

1. Connect the CLV to the SICK AMV/S 60 Connection Module via the external parameter memory no. 2 020 307 using the two cables.
2. Connect the reading pulse sensor (e. g. photoelectric reflex switch) to the "Sensor" switching input of the CLV via the AMV/S 60 (see *Chapter 5.5.7 Connecting the switching inputs, Page 5-16*).
3. Switch on the power supply of the AMV/S 60.
   The CLV starts. In the default setting, the start option is set to START WITH EXTERNAL PARAMETERS.
   Once the CLV has started, the "Device Ready" and "Read Result" LEDs blink continuously. This indicates that the CLV was able to address the external parameter memory but the memory is empty (default state).
   The CLV is then initialized with its internal parameter set but does not output data on its host interface. **The CLV is not ready for operation!**

   Line scanner with oscillating mirror:
   In the default setting, the CLV deflects the scan line around the position CW = 50 with a frequency of 1 Hz and an oscillating amplitude of ±20° (±40 CW). 50 CW corresponding to a deflection angle below 105°.
4. Connect the PC to the terminal interface of the CLV. To do so, connect the RS 232 data connection cable (e. g. no. 2 014 054) to the "Service" plug in the AMV/S 60 (see *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*).

5. Start Windows and the "CLV-Setup" program (see *Chapter 10.6.3 Starting CLV-Setup, Page 10-43*).
   CLV-Setup attempts by default to communicate with the CLV via COM 1. If the communication parameters match, "CLV-Setup" uploads the current parameter set from the RAM of the CLV to the internal database and displays the values in the tabs (the parameter set contains the factory default settings when the scanner is switched on for the first time). If necessary, choose "CLV 490" in the DEVICE drop-down list in the top right-hand corner in order to initiate communication and the upload manually.
6. Choose the DEVICE CONFIGURATION tab.
7. Click the COPY INTERN ⇨ EXTERN field in the START WITH box.
   CLV-Setup then instructs the CLV to copy the internal parameter set to the external parameter memory the next time it starts.
8. Carry out a download to the CLV by clicking in the toolbar.
   CLV-Setup copies the parameter set with the new start option by downloading it to the CLV. The DOWNLOAD PARAMETERS dialog box is then displayed.
9. Confirm the dialog box by choosing the PERMANENT storage option.
10. Disconnect the AMV/S 60 briefly from the power supply to restart the CLV.
    Once the CLV has started, the "Device Ready" and "Read Result" LEDs blink alternately for approx. 10 s before the "Device Ready" LED lights up constantly.
    The "Result 1" ("Device Ready") output switches.
    The CLV has copied the parameter set to the external parameter memory and reset the start option automatically to START WITH EXTERNAL PARAMETERS.

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The CLV and external parameter memory are then ready for operation with the factory settings. The next time the device is started, the "Device Ready" LED blinks for approx. 10 s and then lights up constantly.

Continue the quick start as of Step 4 in *Chapter 6.3.1 Switching the CLV on for the first time with the factory default settings, Page 6-3*.

6.4 Configuring (parameterization) the CLV

The CLV adapts to the reading situation locally with the configuration. The read, evaluation and output characteristics can, therefore, be parameterized as required on the basis of the factory default settings or an application-specific CLV parameter set that has already been created.

The CLV supports two different configuration methods:

- Configuration via the "CLV-Setup" program
  (parameter values are set via the serial interface)
- Configuration via command strings
  (parameter values are set via the serial interface).
  See *Chapter 10.7 Configuring a CLV with command strings, Page 10-49*.

In the Parameterization mode, the CLV outputs no reading result.

6.4.1 Configuring the CLV via the user interface of CLV-Setup

To be able to use CLV-Setup, a PC has to be connected and the program installed on it. The procedure for connecting the PC to the CLV is described in *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*. The procedures for installing and starting the "CLV-Setup" program and for starting and operating the user interface are described in the Appendix (*Chapter 10.6 Installing and operating the "CLV-Setup" program, Page 10-41*).

Transferring a parameter set between CLV-Setup and the CLV

When the CLV is being parameterized, CLV-Setup runs in the **offline mode**. To be able to modify the current parameter set of the CLV, this first has to be loaded to CLV-Setup from the CLV. This procedure is referred to as an **upload** ("upload from CLV") during which CLV-Setup always loads a complete copy of the current CLV parameter set. This parameter set remains unchanged until it is overwritten by CLV-Setup. With the help of the context menu (right mouse button), only the parameter just edited can be loaded ("upload parameter") from the CLV's memory (RAM).
Changes made to the current parameter set in CLV-Setup do not take effect until the parameter set has been transferred to the CLV. CLV-Setup always sends a copy of the complete parameter set to the CLV, i. e. all of the existing parameter values in the CLV are overwritten. The procedure for transferring and saving the parameter values in the CLV is referred to as a **download** ("download to CLV"). With the help of the context menu (right mouse button), only the parameter just edited will be **temporarily** loaded ("download parameter") into the CLV's memory (RAM).

Loading a complete CLV parameter set (upload)

➢ Click in the toolbar.
CLV-Setup loads the current CLV parameter set from the RAM of the CLV to its database and displays the values in the tabs.
The "Device Ready" LED is extinguished during the upload.

If the "CLV-Setup" program does not recognize parameters transferred during the upload, it outputs a warning message. Unknown parameters can be edited in the EXTRAS tab by

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following the conventions for command strings. When the parameter set is then saved, these parameters are also saved.

Transferring and saving a complete CLV parameter set (download)

1. Click in the toolbar.
   The "Device Ready" LED is extinguished.
   CLV-Setup copies the parameter set to the RAM of the CLV. The DOWNLOAD PARAMETERS dialog box with the storage options is then displayed.
   PERMANENT: CLV-Setup copies the parameter record to the RAM and to the EEPROM of the CLV.
   TEMPORARY: CLV-Setup copies the parameter record to the RAM only. The changes are lost when the CLV supply voltage is switched off.
2. Confirm the dialog box with the desired storage option.
   The "Device Ready" LED lights up again.

The new parameter set is stored in the CLV either permanently or temporarily.

CLV with external parameter memory

If the parameter set was downloaded and stored **permanently**, CLV-Setup opens a further dialog box for adjusting the parameter set in the external memory, if the start option is set to START WITH EXTERNAL PARAMETERS.

➢ Choose the COPY NOW INTERNAL PARAMETER SET TO EXTERNAL MEMORY option.
CLV-Setup then instructs the CLV to copy the new parameter set to the external memory. The "Device Ready" LED lights up again.

The internal and external parameter sets are now identical.
See also *Chapter 10.3.5 Adjusting the parameter set in the external parameter memory after it has been downloaded to the CLV, Page 10-36*.

Saving a parameter set in CLV-Setup

1. To save the modified parameter set as a new configuration file in CLV-Setup, or to overwrite an existing file, choose FILE and SAVE AS.
   The CLV FILE SELECTOR dialog box is then displayed.
2. Enter the file name in the dialog box (file name extension "*.scl") and confirm the entry.

The new parameter set is now stored in CLV-Setup in the subdirectory "data".

6.4.2 Function of the tabs in CLV-Setup (overview)

Reading Configuration

This tab and further dialog boxes are used to set the following:

- Scanning frequency
- Start/stop ratio
- Autofocus mode (distance measurement, preference focus distance, delay of focus change, depth of field optimization, autofocus space, delimitations, extent of deflection)
- Reading distance configuration for event-controlled focus control (focus position, evaluation range of the scan line, assignment table)
- Trigger source for the focus control (if event-controlled)
- Adjustment to bar code quality caracteristics and relative module width

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Device Configuration

This tab and further dialog boxes are used to set the following:

- Device number
- Source of the Reading trigger mode
- Laser timeout
- Output time of the Reading result referred to the start of the reading interval
- Scanner position parameters (the position of the CLV in the area)
- Tracking parameters
- Object polling parameters
- Output filter of the reading result (host interface)
- Physical arrangement for data output via the host interface (stand-alone, master/slave)
- Functional assignment of the IN 3 and "IN 4" switching inputs
- Functional assignments of the "Result 1 ... Result 4" switching outputs
- Start option for accessing the parameter set
- Code position comparison

Code Configuration

This tab and further dialog boxes are used to set the following:

- Type of active decoder (SMART or standard decoder)
- Evaluation routines for individual code types
- Number of identical reads (multiple reads)
- Minimum and maximum number of bar codes to be read/output
- Kind of Start/Stop recognition
- Activation of the comparison of the code position for the separation of identical bar codes

Recommendation To enhance the reading reliability with fast applications, only activate those code types and code lengths that are actually relevant.

Host Interface

This tab and further dialog boxes are used to set the following:

- Destination of the read result date strings (host interface or CAN interface)
- Active physical interface (RS 422/485 or RS 232)
- Data format and transmission rate
- Data transmission protocol
- Start and stop characters of the interface protocol

Data Strings

This tab and further dialog boxes are used to set the following:

- Data output format of the host interface (telegram format)
- Constants and reading diagnosis data in the header, separator and terminator
- Arrangement of the separators in the data string
- Output format for no reads and contents of the error string
- Test string function
- Output sequence and sort criteria for reading more than one bar code per reading pulse
- Format mask and its structure

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Auxiliary Interface

This tab and further dialog boxes are used to change the following:

- Operating mode of the terminal interface

CAN Interface

This tab and the further dialog windows are used to change the following:

- CAN interface operating mode
- Data transfer rate
- Type of logical data connection of the connected CLV
- Usage of the switch inputs/outputs of the CLV as CANopen Digital I/O

Oscillating Mirror

This tab is used to set the following:

- Operating mode of the oscillating mirror
- Oscillating frequency
- Angle of deflection (oscillating amplitude)
- Start of oscillating mode
- Trigger source for One-Shot

Extras

This tab is used to edit parameters that were not recognized by CLV-Setup after an upload.

Note CLV-Setup Online Help contains a detailed description of the functions of the parameters and their valid entries (see *Chapter 10.6.6 CLV-Setup Help, Page 10-46* for calling up Help).

6.4.3 Parameterizing example

For a simple application,*Chapter 10.10 Discussion of a parameterization example, Page 10-56* in the appendix shows an example of the recommended procedure when parameterizing the CLV. Otherwise, the general guidelines in the next chapter provide orientation during adaptation to the individual reading situation.

6.4.4 Guide to parameterization menu

Overview of parameterization steps

- Adjusting the optical read properties of the scanner
- Configuring a read pulse timing
- Adjusting the decoder's evaluation properties
- Adjusting the output properties (data, result status)
- Specifying the terminal interface function (auxiliary interface)
- Indicating the source of the parameter set for starting up (only with external parameter memory)

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When the CLV is switched on for the first time, it is started with **the factory default** settings. The following parameters must then be set:

a) Adjusting the optical reading properties

- Scanning frequency ⇨ READING CONFIGURATION tab ⇨ Reading Parameters
- Blank zone ⇨ READING CONFIGURATION tab ⇨ Start/stop ratio
- Poor quality bar code print ⇨ READING CONFIGURATION tab ⇨ Code label characteristics
- Relative modul width ⇨ READING CONFIGURATION tab ⇨ Code label characteristics

Parameterizing the autofocus mode (Part 1):

Action	Line scanner	Line scanner with oscillating mirror
1. Activate autofocus mode	⇨ READING CONFIGURATION tab FOCUS TRIGGER SOURCE ⇨ Autofocus	⇨ READING CONFIGURATION tab FOCUS TRIGGER SOURCE ⇨ •Autofocus
2. Choose autofocus mode	AUTOFOCUS ⇨ MODE – Minimum distance or – Differential background or – Differential background and tracking see *Table 6-5, Page 6-10*	AUTOFOCUS ⇨ MODE – Minimum distance or – Differential background or – Differential background and tracking see *Table 6-5, Page 6-10*
3. Configure CLV for distance measurement (define visible range)	AUTOFOCUS ⇨ EDIT READING FIELD – Minimum Code Position CP – Maximum Code Position CP	AUTOFOCUS ⇨ EDIT READING FIELD – Minimum Code Position CP – Maximum Code Position CP – *Oscillating mirror amplitude CW*
4. Set up autofocus mode	AUTOFOCUS ⇨ EDIT AUTO FOCUS ⇨ ADJUSTMENTS – Preference focus distance – Focus relase ⇨ LIMITS – Auto focus limitation – Scan angle limitation – Auto focus space, see *Table 6-5, Page 6-10* ⇨ OPTIMIZATIONS – Delay of focus change – Depth of field optimization – Object height passing in OTS mode – Distance measurement ⇨ ACTIVE – Source of distance information	AUTOFOCUS ⇨ EDIT AUTO FOCUS ⇨ ADJUSTMENTS – Prefereence focus distance – Focus relase ⇨ LIMITS – Auto focus limitation – Scan angle limitation – Oscillating angle limitation – Auto focus space, see *Table 6-5, Page 6-10* ⇨ OPTIMIZATIONS – Delay of focus change – Depth of field optimization – Object height passing in OTS mode – Distance measurement ⇨ ACTIVE – Source of distance information
5. Choose time of focusing (based on reading pulse)	FOCUS TRIGGER SOURCE ⇨ Inputs/Serial/Autofocus – Immediate or Synchronous – Latched	FOCUS TRIGGER SOURCE ⇨ Inputs/Serial/Autofocus – Immediate or Synchronous – Latched

Table 6-4: Guide: Parameterizing autofocus mode (Part 1)

Note The minimum and maximum values for the active evaluation range of the scan line (MIN. AND MAX. CODE POSITION) can be checked in the SHOW CP-LIMITS mode.
See *Chapter 6.5.5 Show CP-limits, Page 6-26*.

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Parameterization autofocus function (Part 2):

- Area parameters ⇨ tab DEVICE CONFIGURATION ⇨Edit Scanner position and Edit Tracking Parameters (in OTS mode only)
- Teach-in/show ambient background ⇨ TOOL menu ⇨ Device functions

Parameter	**Minimum Distance**	**Differential background**	**Differential background and Tracking**
Condition	1 object in reading field per reading interval	1 object in reading field per reading interval	No. of objects in the reading field per reading interval: ≥ 1
1. Limits: autofocus limitation	✖	❍	❍
2. Limits: Scan angle limitation	✖	❍	❍
3. Limits: oscillation angle limitation[1)]	✖	✖	✖
4. Limits: autofocus space	–	❍	❍
5. Edit scanner position (angles): angle alpha, beta, gamma	–	✖	✖
6. Edit scanner position (coordinates): Coordinates x, y, z	–	✖	✖
7. Edit tracking parameter: focus release point	–	–	✖
8. Teach-in background	–	❍	❍
✖ : required ❍: optional 1) for line scanners with oscillating mirror			

Table 6-5: Guide: Parameterizing the autofocus function (Part 2)

Fig. 6-2 shows a 2D example of how the visible range of the CLV is adjusted using the parameters "Limit values: scan angle limitation" and "Limit value: autofocus space".

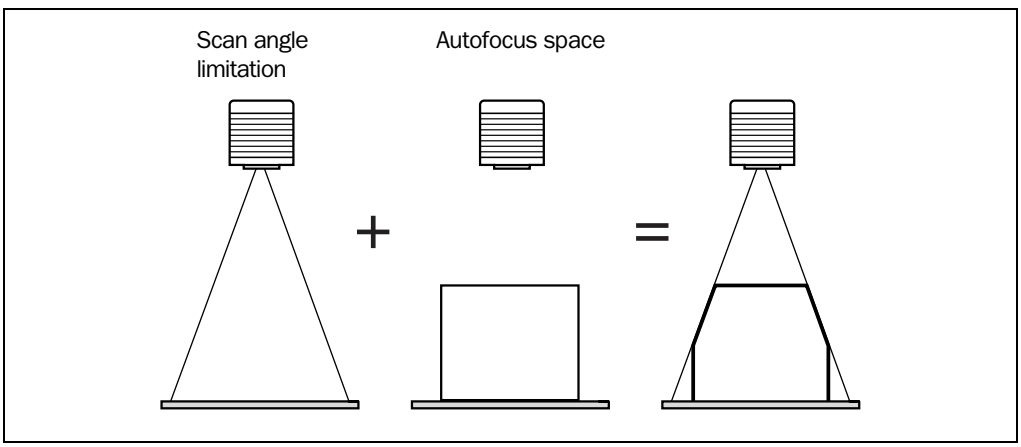

Fig. 6-2: Narrowing the visible range using limit values

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Parameterization the event-controlled focus control (alternative):

Action	Line scanner	Line scanner with oscillating mirror
1. Activate focus control function (choose trigger source)	⇨ READING CONFIGURATION tab ⇨ FOCUS TRIGGER SOURCE – Inputs/Serial or – Timer ⇨TIMER or – Static/No Trigger	⇨ READING CONFIGURATION tab ⇨ FOCUS TRIGGER SOURCE – Inputs/Serial or – Timer or – Static/No Trigger – *Oscillating mirror extrema*
2. Choose focus switchover point (referred to reading pulse)	FOCUS TRIGGER SOURCE ⇨ Inputs/Serial/Autofocus – Immediate or Synchronous – Latched	FOCUS TRIGGER SOURCE ⇨ Inputs/Serial/Autofocus – Immediate or Synchronous – Latched
3. Set up focus control	DISTANCE CONFIGURATION/ASSIGNMENT TABLE ⇨ Distance Configuration – Focus Position – Minimum Code Position CP – Maximum Code Position CP ⇨ Assignment Table – Index – Valid Configurations	DISTANCE CONFIGURATION/ASSIGNMENT TABLE ⇨ Distance Configuration – Focus Position – Minimum Code Position CP – Maximum Code Position CP – *Oscillating mirror extrema* ⇨ Assignment Table – Index – Valid Configurations
4. In INPUTS/SERIAL trigger source: choose function for "IN 3" and "IN 4" switching inputs	⇨ DEVICE CONFIGURATION tab ⇨ ASSIGNMENT IN 3 – Focus Control ⇨ ASSIGNMENT IN 4 – Focus Control	⇨ DEVICE CONFIGURATION tab ⇨ ASSIGNMENT IN 3 – Focus Control ⇨ ASSIGNMENT IN 4 – Focus Control

Table 6-6: Guide: Parameterizing the event-controlled focus control

Note The minimum and maximum values for the active evaluation range of the scan line (MIN. AND MAX. CODE POSITION) can be checked in the SHOW CP-LIMITS mode.
See *Chapter 6.5.5 Show CP-limits, Page 6-26*.

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Parameterization oscillating mirror functions:

Action	Line scanner with oscillating mirror
1. Choose "Oscillating with fixed amplitude" mode (identical amplitude for all distance configurations with event-controlled focus control) – or –	⇨ OSCILLATING MIRROR tab ⇨ OSCILLATING MIRROR – Oscillating with fixed amplitude ⇨ OSCILLATING – Frequency
2. Choose "Oscillating with variable amplitude" mode (amplitude can be chosen for each distance configuration with event-controlled focus control) – or –	⇨ OSCILLATING MIRROR tab ⇨ OSCILLATING MIRROR – Oscillating with variable amplitude ⇨ OSCILLATING – Frequency ⇨ READING CONFIGURATION tab ⇨ EDIT AUTOFOCUS respectively ⇨ Distance Configurations – Oscillating Mirror Amplitude
3. Choose "Fixed Position" mode – or –	⇨ OSCILLATING MIRROR tab ⇨ OSCILLATING MIRROR – Fixed Position ⇨ FIXED POSITION – Stationary Position (CW)
4. Choose "One-Shot" mode	⇨ OSCILLATING MIRROR tab ⇨ OSCILLATING MIRROR – One-Shot ⇨ ONE-SHOT ⇨ PHASE 1 – Mirror Speed – Start Position – Distance Configuration (no.) ⇨ PHASE 2 – Mirror Speed – Start Position – DistanceConfiguration (no.)
5. With One-Shot: choose trigger source	⇨ OSCILLATING MIRROR tab ⇨ ONE-SHOT ⇨ TRIGGER MODE – Reading Trigger Pulse or – "IN 3" switching input or – "IN 4" switching input or – Serial Interface
6. With One-Shot and trigger source "IN 3" or "IN 4": Choose function for switching input "IN 3" or "IN 4"	⇨ DEVICE CONFIGURATION tab ⇨ ASSIGNMENT IN 3 – One Shot or ⇨ ASSIGNMENT IN 4 – One Shot see also *Table 5-21, Page 5-19*
7. Choose activity of oscillating mode	⇨ OSCILLATING MIRROR tab ⇨ OSCILLATING MIRROR acitve – continuous – during reading interval

Table 6-7: Guide: Parameterizing oscillating mirror functions

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Note The OSCILLATE WITH VARIABLE AMPILTUDE operating mode can only be selected from amplitudes of min. ±10 CW and an oscillating frequency of 0.4 Hz or higher.

The scan line must always sweep the neutral position (CW = 50). This means that oscillation is not possible in the range 60 CW to 80 CW, for example, but is possible in the range 40 CW to 80 CW.

Explanation of oscillating mirror functions

1. "Oscillating with fixed amplitude" mode

The oscillating mirror deflects the scan line up to the maximum angle of deflection of ±40 CW (corresponds to ±20°). *Fig. 6-3* illustrates this mode when a bar code is read from above.

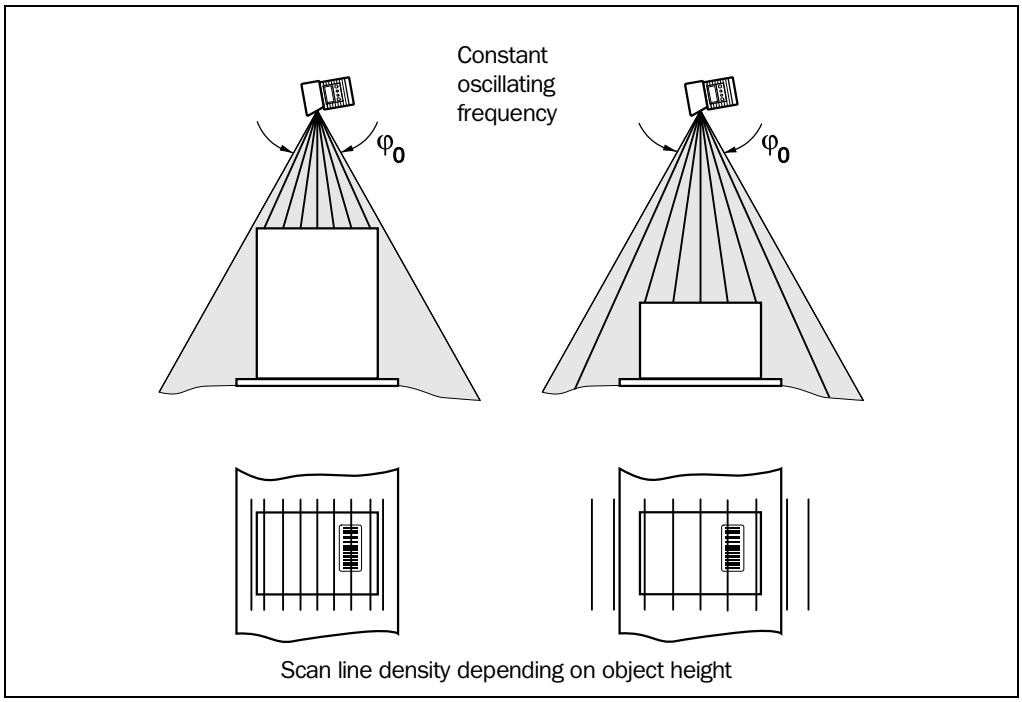

Fig. 6-3: Oscillating mirror: "Oscillating with fixed amplitude" mode

2. "Oscillating with Variable Amplitude" mode

The deflection range can be parameterized separately for each of the maximum of 8 distance configurations/focus positions. The minimum/maximum values that can be set for the deflection range for fast applications ensure that the scan line only sweeps areas that contain bar codes during the time available. This also ensures that the scan line density on the object is, for the most part, constant. *Fig. 6-4, Page 6-14* illustrates this mode when a bar code is read from above.

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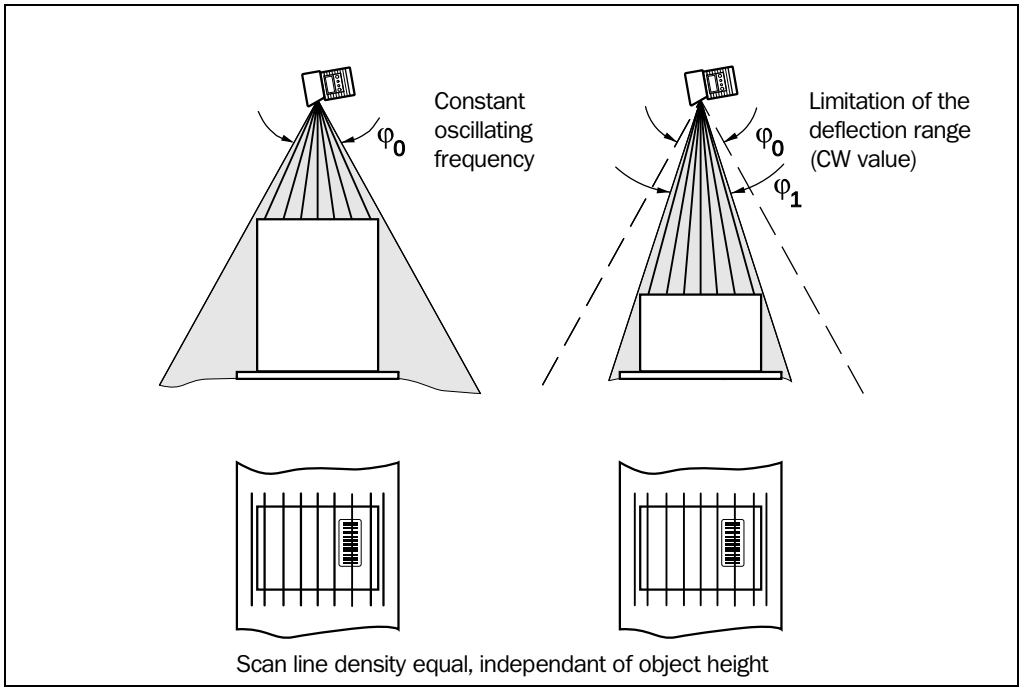

Fig. 6-4: Oscillating mirror: "Oscillating with variable amplitude" mode

3. "Fixed Position" mode

The CLV parks the oscillating mirror at the desired position. 10 CW corresponds to –20°, and 90 CW to +20° (see *Fig. 4-8, Page 4-6*). In the default setting, the fixed position is set to 50 CW (corresponds to an angle of deflection below 105°). The Oscillating mode is switched off.

4. "One-Shot" mode

In the "One-Shot" mode, the oscillating mirror only performs one specific oscillating movement per reading interval. This movement consists of a forward phase and a return phase. The start position of the scan line, the mirror speed and the valid distance configuration can be parameterized separately for each phase. The end position of the one phase forms the start position of the other phase. *Fig. 6-5, Page 6-15* illustrates this mode with object tracking. During the forward phase, the front of the object that moves towards the oscillating mirror is swept once by the scan line from top to bottom in accordance with the conveyor speed. Multiple focus position switchovers are not necessary as the required reading range (DOF) is much smaller than with the line scanner. *Fig. 10-42, Page 10-53* explains how the start position and mirror speed are calculated for a given conveyor speed.

Possible trigger sources for One-Shot:

- "IN 3" or "IN 4" switching input
- Command string (via serial interface)
- Reading interval

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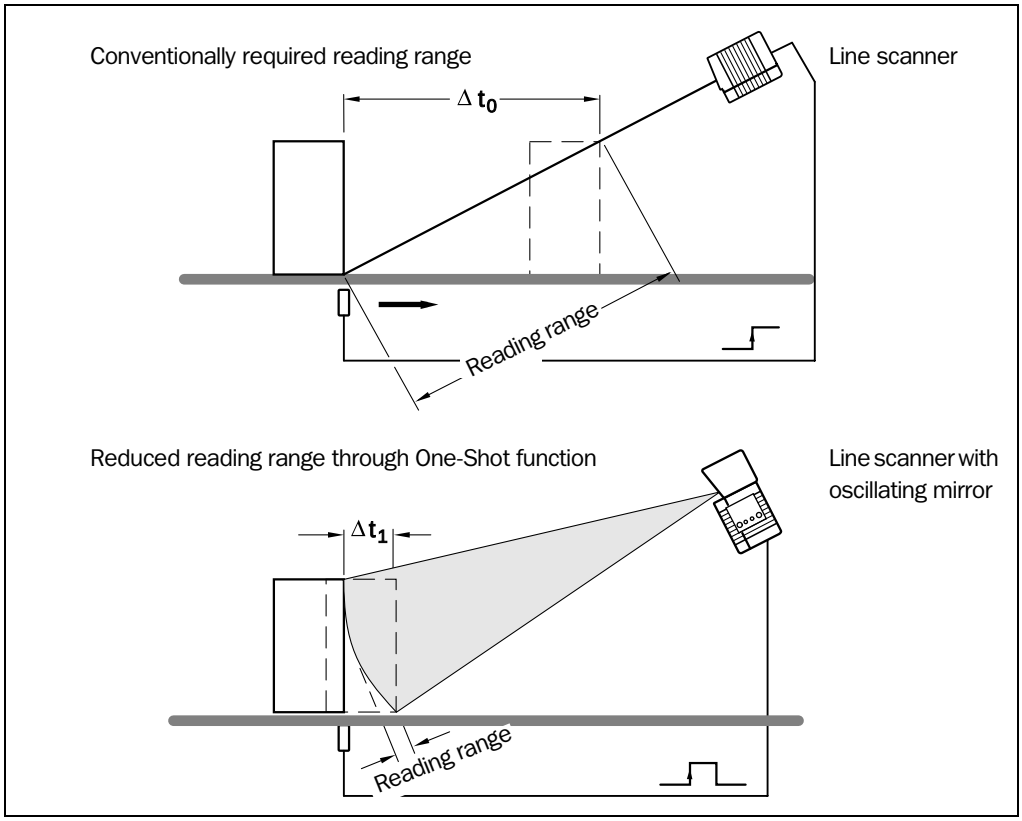

Fig. 6-5: One-Shot: Object tracking (bar code read from front)

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b) Parameterizing the reading trigger source:

Action	Settings
1. Reading trigger: choose source for start	⇨ DEVICE CONFIGURATION tab ⇨ •READING TRIGGER MODE – Sensor Input (Active High) or – Sensor Input (Active Low) or – Serial Interface or – Free Running with Timeout or – OPC-Trigger (special usage) or – OTS-Trigger (special usage)
2. Trigger source "Sensor Input": Choose debouncing and response with first trigger	⇨ EDIT READING TRIGGER ⇨ DEBOUNCING SENSOR – Standard or – Fast ⇨ FIRST TRIGGER SENSOR – Dynamic or – Static
3. Trigger source "Serial Interface": choose trigger character	⇨ EDIT READING TRIGGER ⇨ SERIAL INTERFACE – Standard Trigger or – Single Character
4. Trigger source "Free Running": choose timeout	⇨ EDIT READING TRIGGER ⇨ END OF LABLE/FREE RUNNING – Timeout
5. Reading trigger: choose source for end	⇨ EDIT READING TRIGGER ⇨ END OF READING INTERVAL – Generated by Trigger Source or – Timer or – Switching Input IN 4

Table 6-8: Guide: Parameterizing the reading trigger source

c) Parameterizing the laser timeout:

Action	Settings
1. Choose laser timeout duration **– or –**	⇨ DEVICE CONFIGURATION tab ⇨ EDIT READING TRIGGER ⇨ LASER TIMEOUT – Duration
2. Deactivate laser timeout (The laser diode is always active, independent of the pulse duration)	⇨ LASER TIMEOUT – Click (deactivate) the control box INTERVAL ACTIVE

Table 6-9: Guide: Parameterizing the laser timeout

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d) Parameterizing the evaluation characteristics

- Choose decoder type ⇨ CODE CONFIGURATION tab ⇨ Decoder
- Activate code types for evaluation ⇨ CODE CONFIGURATION tab ⇨ Codes and Edit Codes
- Activate code comparison ⇨ DEVICE CONFIGURATION tab ⇨ EDIT MATCH CODES
- Define output time of reading result ⇨ CODE CONFIGURATION tab ⇨ Output on Good Read

Number of bar codes per object	**Line scanner**	**Line scanner with oscillating mirror**	
	Stationary/moving conveyor object	**Stationary conveyor object**	**Moving conveyor object**
1. Number n = 1	⇨ CODE CONFIGURATION tab ⇨ CODE POSITION – **Deactivate** "Compare"	⇨ CODE CONFIGURATION tab ⇨ CODE POSITION – **Deactivate** "Compare"	⇨ CODE CONFIGURATION tab ⇨ CODE POSITION – **Activate** "Compare"
2. Number n > 1: – Same code type – Contents different or identical	⇨ CODE POSITION – **Activate** "Compare" ⇨ NUMBER OF CODES – Minimum – Maximum	⇨ CODE POSITION – **Activate** "Compare" ⇨ NUMBER OF CODES – Minimum – Maximum	⇨ NUMBER OF CODES – Minimum – Maximum
3. Number n > 1: – Code type different – Contents different or identical	⇨ CODE POSITION – **Deactivate** "Compare" ⇨ NUMBER OF CODES – Minimum – Maximum	⇨ CODE POSITION – **Deactivate** "Compare" ⇨ NUMBER OF CODES – Minimum – Maximum	⇨ DEVICE CONFIGURATION tab ⇨ EDIT TRACKING PARAMETERS – Assigment tolerance

Table 6-10: Guide: Settings for evaluating identical bar codes

Note If the number n > 1, minimum clearances must be provided in the following cases:

- The SMART decoder is to read bar codes that originate from the same code type and have identical or different data contents
- The standard decoder is to read and distinguish bar codes with the same name (identical code type and data content)

The necessary calculations are provided in *Chapter 10.8.3 Calculating the necessary bar code distance if several bar codes are read on each object, Page 10-54*.

e) Parameterizing the output characteristics

Result status: Switching outputs

- Define function of result status output of "Result 1" ... "Result 4" switching outputs: DEVICE CONFIGURATION tab ⇨ Edit Result Outputs•

Main Data Interface general

- Filter reading result ⇨ DEVICE CONFIGURATION tab ⇨ Odette filter
- Sort reading result ⇨ DATA STRINGS tab ⇨ Output Sequence Sort
- Mask reading result ⇨ DATA STRINGS tab ⇨ Format Mask
- Destination result data strings ⇨ HOST INTERFACE tab ⇨ destination of result data strings

Host Interface:

- Arrangement in data network ⇨ DEVICE CONFIGURATION tab ⇨ scanner arrangement
- Physical interface ⇨ HOST INTERFACE tab ⇨ Data Format
- Communication parameters ⇨ HOST INTERFACE tab ⇨ Data Format
- Protocol ⇨ HOST INTERFACE tab ⇨ Interface Protocol

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Function of the CAN interface (alternative):

See the operating instructions *"Application of the CAN interface"* (no. 8 009 180)

Data output string of host interface:

- Choose contents of header, separator and terminator ⇨ DATA STRINGS tab ⇨ Output Format
- Position of separator in data output string ⇨ DATA STRINGS tab ⇨ Separator Position
- Set wrong read format ⇨ DATA STRINGS tab ⇨ Wrong read format, Character Count and Error String
- If necessary, parameterize/activate test string ⇨ DATA STRINGS tab ⇨ Test String
- Parameterize special functions ⇨ DATA STRINGS tab ⇨ Specials

f) Parameterizing the auxiliary interface (terminal interface)

- AUXILIARY INTERFACE tab

g) Defining the start option for accessing the parameter set

- On the DEVICE CONFIGURATION tab ⇨ choose START WITH

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6.5 Operating modes and outputing the reading result

The following CLV operating modes/functions can be selected in CLV-Setup:

Standard operating mode:

- Reading mode

For setup:

- Percentage evaluation
- Adjusting mode

For adapting the device to the application at hand:

- Configuring (parameterizing) the CLV
  See *Chapter 6.4.1 Configuring the CLV via the user interface of CLV-Setup, Page 6-5*
- Background teach-in
- Show CP-limits

For monitoring purposes/trouble shooting

- Display and edit operating data
- Reading diagnosis
- Monitor host interface
- Auxiliary input
- Self-test

6.5.1 Reading mode (standard operating mode)

The CLV performs a self-test after it has been switched on. It switches to Reading mode ("Device Ready" LED lights up). In the default setting the "Sensor" switching input is the (external) trigger source of the reading pulse. The reading result is output by the CLV at the end of the reading pulse via the host interface (default setting) and terminal interface.

The reading result of the terminal interface can be displayed in the CLV-Setup Terminal Emulator. The CLV terminal interface must be set to the READING DIAGNOSIS mode for this purpose. This mode is selected for the default setting. The reading result of the terminal interface has a fixed, invariable format.

The Reading mode can be called up by choosing VIEW in the menu bar or via the Terminal Emulator.

Line scanner with oscillating mirror:
In the Reading mode the CLV deflects (by default) the scan line about the position CW = 50 at a frequency of 1 Hz and a maximum angle of ±20°. 50 CW corresponds to an angle of deflection of 105°.

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Displaying the reading result in the Terminal Emulator:

1. Click in the toolbar.
   The Terminal Emulator window is then displayed.
2. In the DEVICE MODE section, choose READING MODE.
3. Present the bar code pattern from *Fig. 6-1* to the CLV and activate the reading pulse.
   The "Sensor" LED lights up and the scan line appears. Also refer to *Chapter 6.3.1 Switching the CLV on for the first time with the factory default settings, Page 6-3*.
4. Ending the reading pulse.
   The CLV displays the reading result in the output window of the Terminal Emulator.
   The "Read Result" LED lights up for a duration of 100 ms (default setting).

Fig. 6-6 shows two examples of the output of a reading result: Good Read and No Read. The reading result comprises the data contents of the bar code(s) and the reading diagnosis data. *Fig. 6-7* explains the structure and function of the reading diagnosis data for Good Read, and *Fig. 6-8, Page 6-21* for No Read.

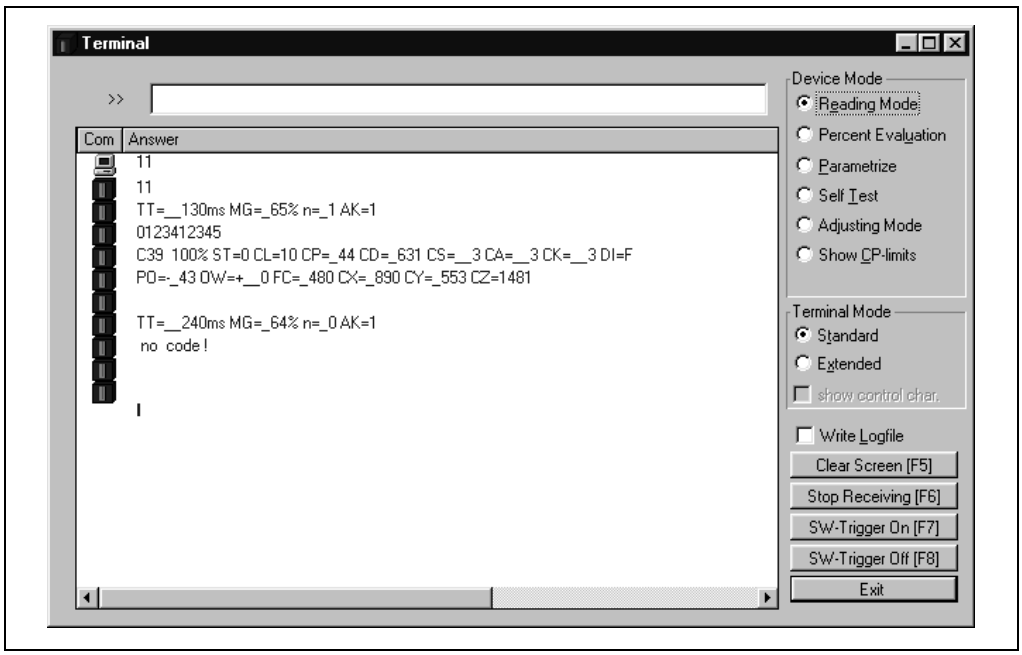

Fig. 6-6: CLV-Setup: Displaying the reading result in the Terminal Emulator

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Good Read:

```
TT=_ _130 ms     MG=_65 %  n=_1   AK=1
0123412345
C39       100% ST=0  CL=10  CP=_44  CD=_631  CS=_ _3  CA=_ _3 CK=_ _3  DI=F
PO=–_43      OW=+_ _0  FC=_480  CX=_890 CY=_553  CZ=1481
```

With:

1st. line :	TT	=	Duration of the reading interval
	MG	=	Temporal mean value of the identification quality
	n	=	Number of detected bar codes
	AK	=	No. of the used distance configuration[1)]
2nd. line:	0123412345	=	Data contents of the bar code
3rd. line:	C39	=	ID: Code type Code 39 along
	_99%	=	Identification quality
	ST	=	Read status (ST = 0: Good Read)
	CP	=	Code position
	CL	=	Code length (number of characters)
	CA	=	Scan effort
	CS	=	Code reliability
	CK	=	Code continuity
	DI	=	Decoding direction (F = in scanning direction, R = against scanning direction
4th line	PO	=	Exact code position (3-digit for tracking)
	OW	=	Exact oscillating angle (3-digit for tracking)
	FC	=	Current focus position (4-digit for tracking)
	CX	=	X-coordinate of bar code (for OTS in transport direction)
	CY	=	Y-coordinate of bar code (for OTS across to transport direction)
	CZ	=	Z-coordinate of bar code (for OTS from above directly)

1) not relevant for autofocus function

Fig. 6-7: Reading result of the terminal interface: structure for Good Read

No Read:

```
TT=_ _ 240 ms   MG=_64 %   n=_0   AK=1
no code!
```

1st. line :	TT	=	Duration of the reading interval
	MG	=	Temporal mean value of the identification quality
	n	=	Number of codes detected
	AK	=	No. of the distance configuration used[1)]
2nd. line:	no code!	=	No. bar codes found!

1) not relevant for autofocus function

Fig. 6-8: Reading result of the terminal interface: structure for No Read

Note The CLV only outputs several bar codes in the reading result if the parameterized minimum and maximum number of bar codes is > 1, and several bar codes have been presented to it. The number of bar codes to be read/output for each reading interval can be selected in the CODE CONFIGURATION tab in the NUMBER OF CODES section.
The reading result of the **host interface** can also be displayed. *Chapter 6.5.8 Monitor Host Interface, Page 6-29* describes the procedure for this and the structure of the reading result in the default setting.

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Triggering the reading pulse via the Terminal Emulator

In the default setting the "Sensor" switching input is the (external) trigger source of the reading pulse. The reading pulse can also be triggered directly via the Terminal Emulator of CLV-Setup for test purposes. To do so, a different trigger source must be selected temporarily in the CLV.

1. Choose DEVICE CONFIGURATION tab.
2. In the READING TRIGGER MODE section click the SERIAL INTERFACE option.
3. Perform a download to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
4. Confirm the dialog box by choosing the TEMPORARY storage option.
   The serial interface has been activated as the trigger source of the reading pulse and is ready to receive appropriate commands.
5. Click in the toolbar.
   The Terminal Emulator window is then displayed.
   The CLV is in the Reading mode.
6. Click the SW-TRIGGER ON button or press [F7].
   CLV-Setup sends a start command to the CLV.
   The "Sensor" LED lights up and the scan line appears.
7. Present the bar code pattern from *Fig. 6-1, Page 6-3* to the CLV.
8. Click the SW-TRIGGER OFF button or press [F8].
   CLV-Setup sends a stop command to the CLV. The "Sensor" LED is extinguished. The CLV switches off the laser diode. The CLV displays the reading result in the output window of the Terminal Emulator. The "Read Result" LED lights up for a duration of 100 ms (default setting).

6.5.2 Percentage evaluation

In the Percentage evaluation mode, the quality of the reading function is assessed (no conveyor movement).

The CLV performs 100 scans in the free running mode and evaluates the reading quality. It outputs the reading result continuously every 2 s via the terminal interface. The reading results can be displayed in the Terminal Emulator of CLV-Setup. The standard decoder has to be set temporarily for the percentage evaluation.

The Percentage evaluation mode can be called up by choosing VIEW in the menu bar, as a device function via CLV 490 (interactively), or via the Terminal Emulator.

Line scanner with oscillating mirror:
In the Percent Evaluation mode, the CLV behaves in the following manner:

– in "Oscillating" mode (basic setting: oscillating with a fixed amplitude), the CLV shuts off oscillation and positions the scan line under the angle CW = 50 (corresponds to a deflection angle below 105°). This position cannot be altered.
– in "One-Shot" mode, the CLV positions the scan line under the angle CW = 50 as well.
– in ”Fixed position” mode, however the scan line’s selected position remains unchanged.

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1. Choose the CODE CONFIGURATION tab.
2. In the DECODER section, choose STANDARD.
3. Perform a download to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
4. Confirm the dialog box by choosing the TEMPORARY storage option.
   The CLV then uses the standard decoder.
5. Click in the toolbar.
   The Terminal Emulator window is displayed. The CLV is in the Reading mode.
6. In the DEVICE MODE section, choose PERCENTAGE EVALUATION
   The dialog box for choosing the distance configuration is then displayed.
7. Choose the appropriate distance configuration for the reading distance:
   – with autofocus mode the distance configuration no. 1
   – with event-controlled focus control the distance configuration that corresponds to the reading distance of the object (default setting: no. 1, focus position F1 = 1 200 mm).
8. Confirm the dialog box with OK.
   The "Device Ready" LED is extinguished. The CLV initiates the percentage evaluation and outputs the reading results continuously.
9. Present the bar code pattern from *Fig. 6-1, Page 6-3* and monitor the reading results in the Terminal Emulator window. An example of this can be seen in *Fig. 6-9*.

The "Read Result" LED also provides information on the reading quality:

– The LED is extinguished if reading quality is < 30 %
– The LED blinks twice per second if the reading quality is 30 % ... 70 %
– The LED blinks five times per second if the reading quality is 70 % ... 90 %
– The LED is lit continuously if the reading quality is > 90 %

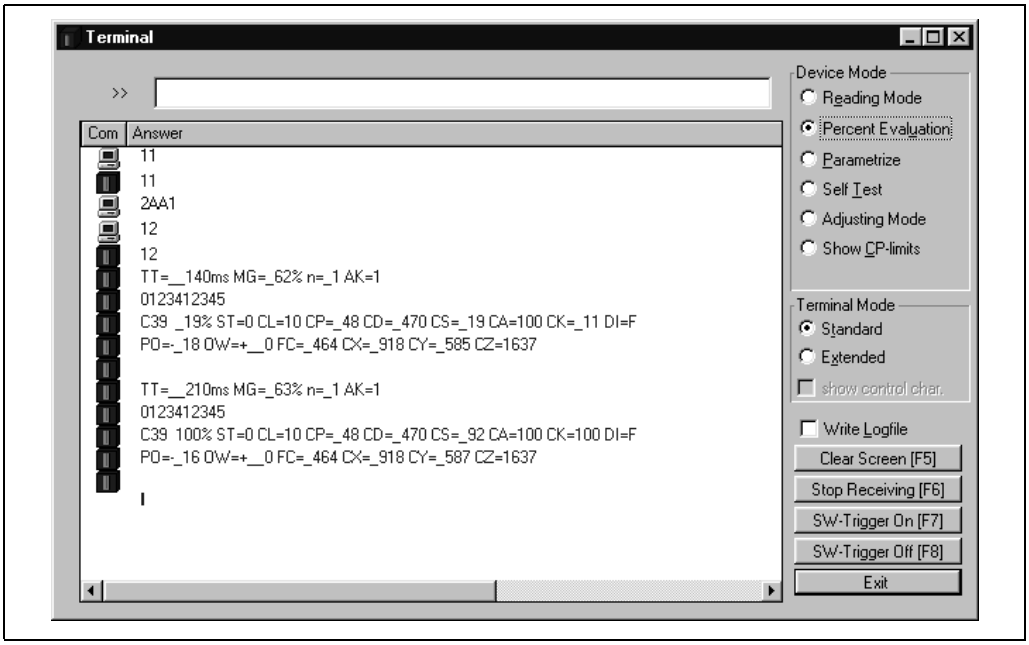

Fig. 6-9: CLV-Setup: Displaying the percentage evaluation in the Terminal Emulator

The output format of the reading result is the same as that of the Reading mode. *Fig. 6-7, Page 6-21* explains the structure and function of the reading diagnosis data.

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6.5.3 Adjusting mode

The Adjusting mode enables the center of the scan line to be optimally positioned on the bar code. *Chapter 4.3.3 Adjusting mode, Page 4-9* describes the procedure for going about this after the Adjusting mode has been called up. The CLV does not output a reading result in this mode.

The Adjusting mode can be called up by choosing VIEW in the menu bar, as a device function via CLV 490 (interactively), or via the Terminal Emulator.

Line scanner with oscillating mirror:
In the "Adjusting" mode, the CLV behaves in the following manner:

– In "Oscillating" mode (default setting: oscillating with a fixed amplitude), the CLV shuts of oscillation and positions the scan line under the angle CW = 50 (corresponds to an angle of deflection below 105°). This position cannot be altered.
– In "One-Shot" mode, the CLV positions the scan line under the angle CW = 50
– In "Fixed Position" mode, the scan line's selected position remains unchanged.

1. Click in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in the Reading mode.
2. In the DEVICE MODE section, choose ADJUSTING MODE.
   The "Device Ready" LED is extinguished. The CLV cancels the Reading mode and blanks the scan line as of position CP = 50 to position CP = 100.
3. Choose READING MODE to exit the Adjusting mode.
   The CLV returns to the Reading mode and the "Device Ready" LED lights up.

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6.5.4 Background teach-in

If the Autofocus function is used in the DIFFERENTIAL BACKGROUND or DIFFERENTIAL BACKGROUND WITH TRACKING mode, the CLV must first learn the **ambient background** in its reading field to narrow the reading field even further. When the internal distance profile is set, the reading field of the CLV must **not contain any objects**. In this mode, the CLV does not output any reading results.

The Background teach-in function can be started as a device function via CLV 490 (interactively), or press the [F2] key.

Line scanner with oscillating mirror:
In the "Background teach-in" mode, the CLV behaves in the following manner:

– in "Oscillating" mode (default setting: oscillating with a fixed amplitude), the CLV shuts off oscillation and positions the scan line under the angle CW = 50 (corresponds to an angle of deflection below 105°). This position cannot be altered.
– in "One-Shot" mode, the CLV positions the scan line under the angle CW = 50.
– in "Fixed Position" mode, the scan line's selected position remains unchanged.

1. Mount the CLV at the reading station and align it with an object containing a bar code.
2. Remove the object so that the CLV has an unobstructed view of the background.
3. Choose CLV 490, DEVICE FUNCTIONS, BACKGROUND, TEACH-IN
   – or –
   press the [F2] key.
   The EXECUTE DEVICE FUNCTIONS window opens.
   Choose BACKGROUND, TEACH-IN in the EXECUTE menue.

   The "Device Ready" LED extinguishes. The CLV then scans its background and learns the ambient background so that it can create a suitable distance profile.
   The CLV outputs a message once the teach-in procedure has been successfully completed (see *Fig. 6-10*).
   The CLV has then learned the ambient background.

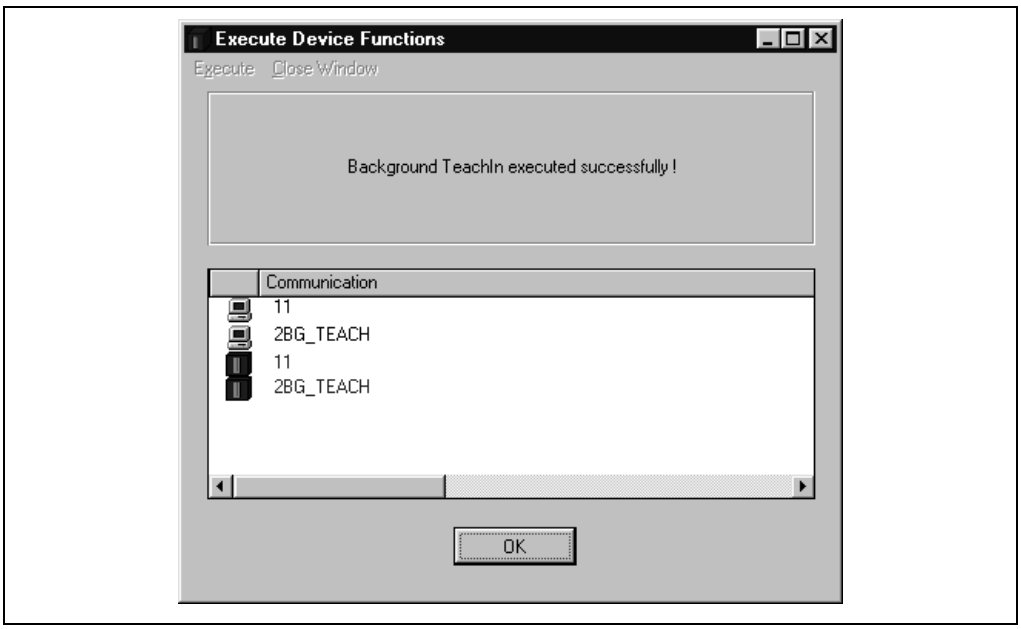

Fig. 6-10: CLV-Setup: Dialog window for running the background teach-in

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4. Choose CLOSE to close the window.
   If the parameters in the CLV were modified as a result of the teach-in procedure, CLV-Setup asks you whether you want to copy and display the modified parameter set by uploading it from the CLV.
5. Confirm the query with YES.
   The dialog box closes automatically.
   The CLV resumes Reading mode and the "Device Ready" LED lights up.

The new background distance profile can be uploaded and displayed in CLV-Setup.

1. Choose the READING CONFIGURATION tab.
2. In the AUTOFOCUS section, click the SHOW BACKGROUND button.
   The SHOW BACKGROUND dialog box appears.
   An example of a distance profile is shown in *Fig. 6-11*.

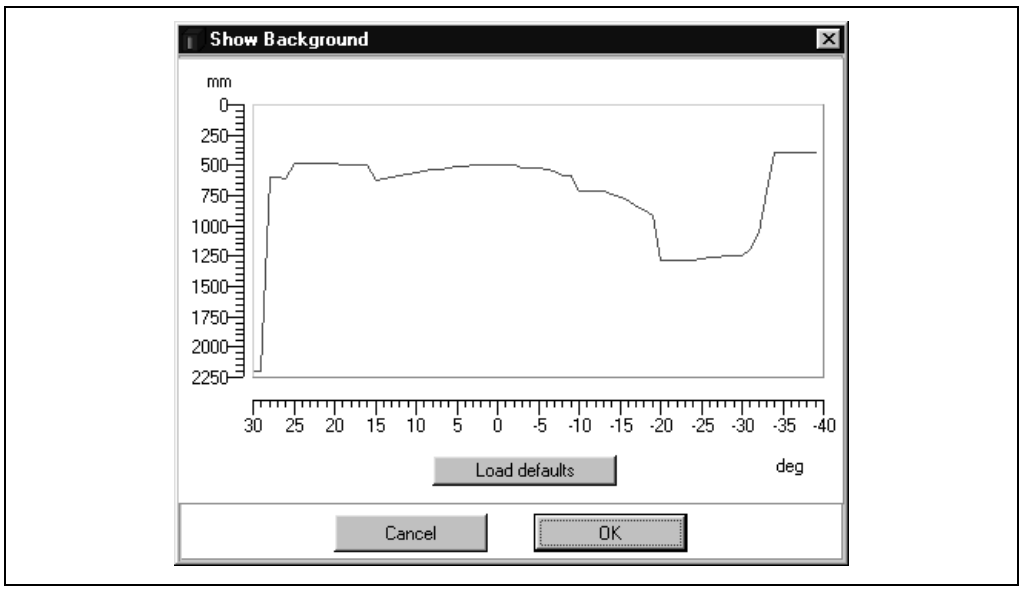

Fig. 6-11: CLV-Setup: Display of th learned background

6.5.5 Show CP-limits

In this mode, the CLV blanks certain parts of the scan line so that any limit values defined for the active evaluation range of the scan line can be checked directly during parameterization. The restricted active evaluation range shortens the evaluation time for fast applications, for example, because the evaluation routine only has to take account of unblanked parts of the scan line. The range is restricted by entering appropriate values for MINIMUM CODE POSITION and MAXIMUM CODE POSITION in the EDIT DISTANCE CONFIGURATIONS dialog box in the READING CONFIGURATION tab.

The CLV does not output a reading result in this mode.

Show CP-limits enables you to check whether

- The visible range of the CLV has been defined accordingly for the selected setting in Autofocus mode (restriction is independent of reading distance and always the same)
- The restriction has been adapted for each active distance configuration in event-controlled dynamic focus control ("Christmas tree" effect)

Show CP-limits can be called up via VIEW in the menu bar, as a device function via CLV 490 (interactively), or via the Terminal Emulator.

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Line scanner with oscillating mirror:
In "Show CP-limits" mode, the CLV behaves in the following manner:

– in "Oscillating" mode (default setting: oscillating with a fixed amplitude), the CLV shuts off oscillation and positions the scan line under the angle CW = 50 (corresponds to an angle of deflection below 105°). This position cannot be altered.
– in "One-Shot" mode, the CLV positions the scan line under the angle CW = 50.
– in "Fixed Position" mode, the scan line's selected position remains unchanged.

The CLV blanks the scan line alternately as of the set value for CP_{min} and as of the set value for CP_{max} . *Fig. 6-12* shows an example of this. The switchover is made continuously at intervals of 1 second. The part of the scan line that remains active for the reading procedure is the section between CP_{min} and CP_{max}.

Example:
Default setting: CP_{min} = 5 to CP_{max} = 95.
The CLV blanks the line as of CP_{min}= 5 (short scan line) and as of CP_{max} = 95 (long line).

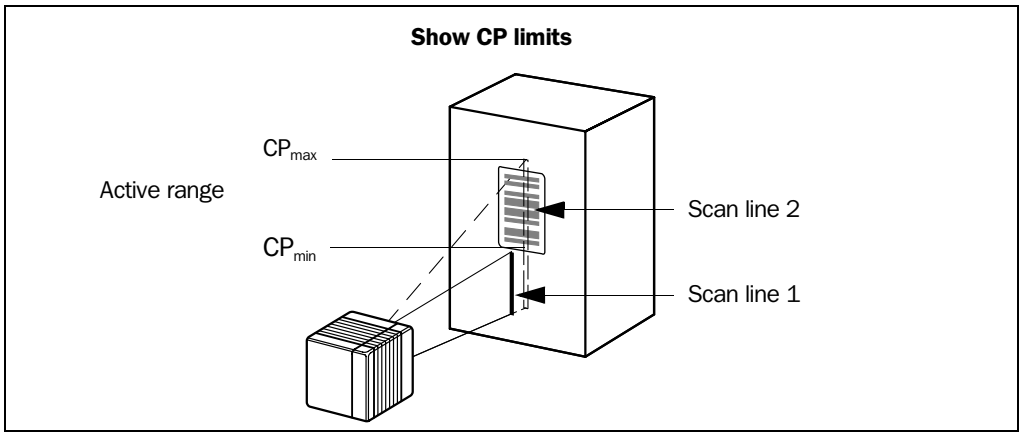

Fig. 6-12: Appearance of scan line in the "Show CP-limits" mode

Proceed as follows to check the restricted evaluation range:

1. Click in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in the Reading mode.
2. In the DEVICE MODE section, choose SHOW CP-LIMITS.
   The dialog box for the distance configuration is then displayed.
3. Click the distance configuration for which the active evaluation range of the scan line has been restricted (DC-specific). The "Device Ready" LED is extinguished. The CLV cancels the Reading mode and blanks the scan line alternately (as described above) as of CP_{min} and CP_{max}.
4. Check *Step 2 and 3* for each active distance configuration to determine whether the bar code is in the center of the range between the end of the shorter scan line (CP_{min}) and the end of the longer scan line (CP_{max}) or, if there are several bar codes, to determine whether the center of the field of all the codes is within the range.
5. If necessary, correct CP_{min} and CP_{max} accordingly. Perform a download to the CLV!
6. Choose READING MODE to exit the Show CP-limits mode. The CLV returns to the Reading mode and the "Device Ready" LED lights up.

Note In the Reading mode, the CLV does not actually blank the scan line visually, but instead takes the values specified for the restricted evaluation range into account when the data contents are decoded.

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6.5.6 Displaying and editing operating data

This function enables statistical operating data, which the CLV maintains in the form of counters during the reading procedure, to be displayed and reset.

The CLV does not output a reading result in this mode.

1. Click in the tool bar.
   The CLV cancels the Reading mode and the "Device Ready" LED is extinguished. The OPERATING DATA dialog box appears (*Fig. 6-13*).
2. After checking/resetting the desired counters, click OK to confirm any changes made. The CLV then returns to the Reading mode and the "Device Ready" LED lights up.

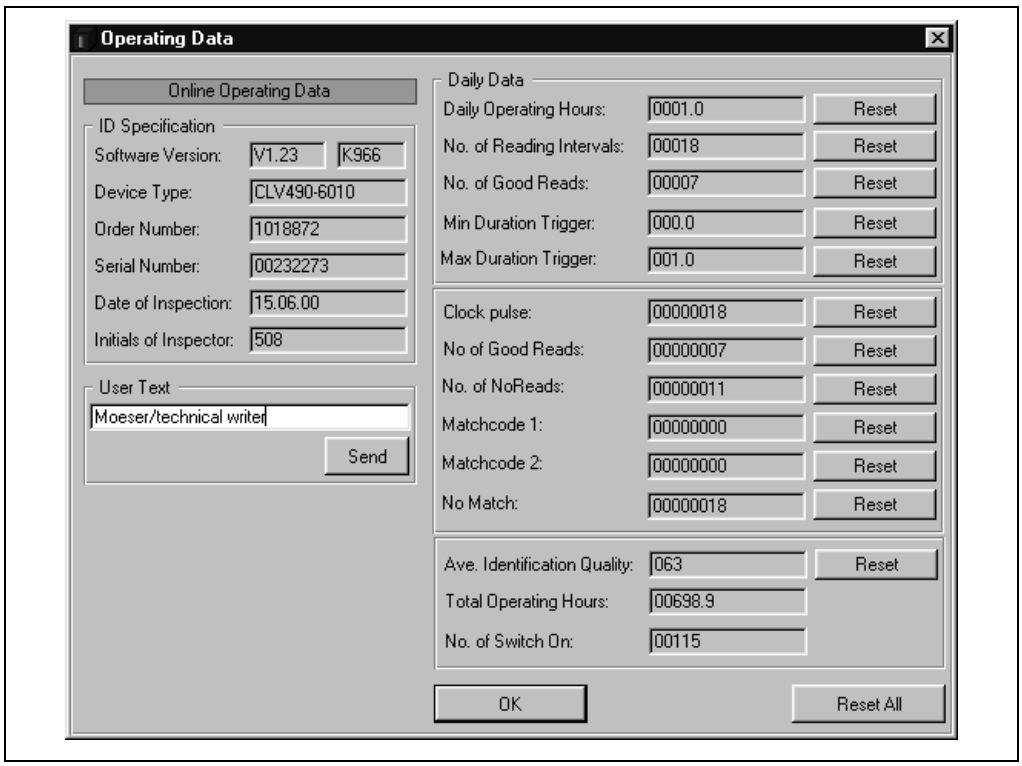

Fig. 6-13: CLV-Setup: "Operating Data" dialog box

6.5.7 Reading diagnosis

Function of the **terminal interface**. In this mode, the CLV outputs the data contents of all the bar codes that were read – including those that, according to the evaluation criteria, were not read properly and were thus incorrect – together with the associated reading diagnosis data via the terminal interface. The number of bar codes output can, therefore, be higher than the number of those that were sent via the host interface in the reading result. In the default setting, this mode is selected for the terminal interface.
Fig. 6-7, Page 6-21 shows the output format of the terminal interface.

In the default setting, the CLV only outputs the error status ST in the separator via the host interface.

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If the reading diagnosis is to remain inactive, this can be set via the AUXILIARY INTERFACE tab.

1. In the AUXILIARY INTERFACE drop-down list, choose READ DIAGNOSTICS.
2. Perform a download to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
3. Choose the PERMANENT storage option in the dialog box.

The terminal interface is now set to the "Read Diagnostics" mode.

6.5.8 Monitor Host Interface

Function of the **terminal interface**. In this mode, the CLV outputs the data traffic of its host interface via the terminal interface. Protocol driver handshakes and protocol-specific data, such as start and stop characters, are suppressed here. Each data string is displayed on a separate line on the screen. Two monitoring modes are available that differ with regard to the data output format (*Table 6-11*).

Mode	Direction of data	Output format	Representation on screen
"Monitoring host interface"	CLV receives from host CLV sends to host	<STX> **I** Data <CR> <LF> <ETX> <STX> **O** Data <CR> <LF> <ETX>	I Data O Data
"Monitoring host interface 2"	CLV receives from host CLV sends to host	<STX> Data <ETX> <STX> Data <ETX>	Data Data

Table 6-11: "Monitor Host Interface" function

The MONITOR HOST INTERFACE or MONITOR HOST INTERFACE 2 function is activated via the AUXILIARY INTERFACE tab.

1. In the AUXILIARY INTERFACE drop-down list, choose MONITOR HOST INTERFACE or MONITOR HOST INTERFACE 2.
2. Perform a download to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
3. Choose the TEMPORARY storage option in the dialog box.

The terminal interface is then set to the MONITOR HOST INTERFACE function until the CLV is switched off again.

Displaying the data traffic of the host interface in the Terminal Emulator:

The data traffic of the host interface can be displayed in the Terminal Emulator of CLV-Setup. *Fig. 6-14, Page 6-30* shows an example of how the reading result can be output.

1. Choose the serial interface as the external trigger source for the reading pulse.
   See *Chapter 6.5.1 Reading mode (standard operating mode), Page 6-19*, *Triggering the reading pulse via the Terminal Emulator*.
2. Click in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in the Reading mode.
3. Click on the SW-TRIGGER ON button or press [F7].
   The scan line then appears.
4. Present the bar code pattern from *Fig. 6-1, Page 6-3*.
5. Click the SW-TRIGGER OFF button or press [F8].
   CLV-Setup outputs the reading result in the Terminal Emulator.
   Example: "O 0123412345".

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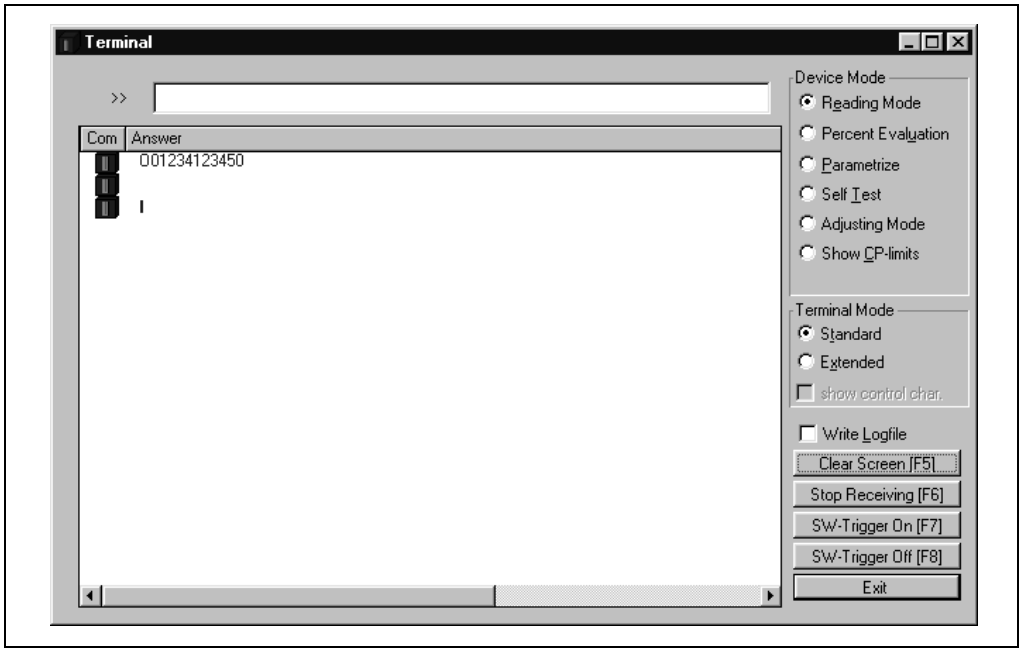

Fig. 6-14: CLV-Setup: Displaying the reading result of the host interface in the Terminal Emulator with direction identifier at the beginning (in this case: O = Output)

Note If a large amount of data is being read in at high speed and with a high transmission rate, the host interface's data trafficing may no longer be completely displayed on the terminal interface (display "..."). This is due to the slower transmission rate of the terminal interface (9 600 bit/s).

In the default setting, the CLV sends the following in the data output string of the host interface:

- Data contents of the bar codes
- The ST error status in the separator
- The control characters in the terminator <CR> <LF>

The header is blank.

Tip The structure of the data output string of the host interface can be configured via the DATA STRINGS tab.

Up to 10 elements, consisting of constants and/or reading diagnosis data, can be entered in the header, in the separator and in the terminator.

1. Choose the DATA STRINGS tab.
2. Click the HEADER field.
   The EDIT PARAMETER: TFH dialog box is then displayed.
3. Click the desired constants or placeholders for the reading diagnosis data.
   The selected elements appear in the text box at the top of the dialog box in the sequence in which they were selected.
4. Confirm the entries made by clicking OK.
5. Repeat this procedure for the separator and terminator.
6. Perform a download to the CLV by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is then displayed.
7. Choose the PERMANENT storage option in the dialog box.
   The CLV outputs the selected elements in the data output string of the host interface with the next reading result.

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6.5.9 Auxiliary input

Function of the **terminal interface**. In this mode, the CLV accepts a bar code entered at the terminal interface (via the keyboard or handheld scanner with decoder). It sends the bar code to the host in a separate data string via its host interface. No reads can, therefore, be corrected by transmitting missing bar codes subsequently.

Chapter 10.11.1 Auxiliary input, Page 10-65 describes this function and the associated procedure in greater detail.

6.5.10 Self-test

After the CLV has been switched on, it performs a self-test before it is initialized with the parameter set. The test can be called up explicitly at any time via CLV-Setup. During the self-test, the CLV checks that its hardware components are functioning correctly. A final message via the terminal interface provides information on the test result. The CLV does not output a reading result during the test routine.

1. Click in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in the Reading mode.
2. In the DEVICE MODE section, choose SELF TEST.
   The "Device Ready" LED is extinguished. The CLV cancels the Reading mode and starts the test routine.
   After a few seconds, the CLV outputs the encoded test result in the form of a code number (*Fig. 6-15*).
3. To return to the Reading mode, click READING MODE or close the Terminal Emulator.
   The CLV then returns to the Reading mode and the "Device Ready" LED lights up.

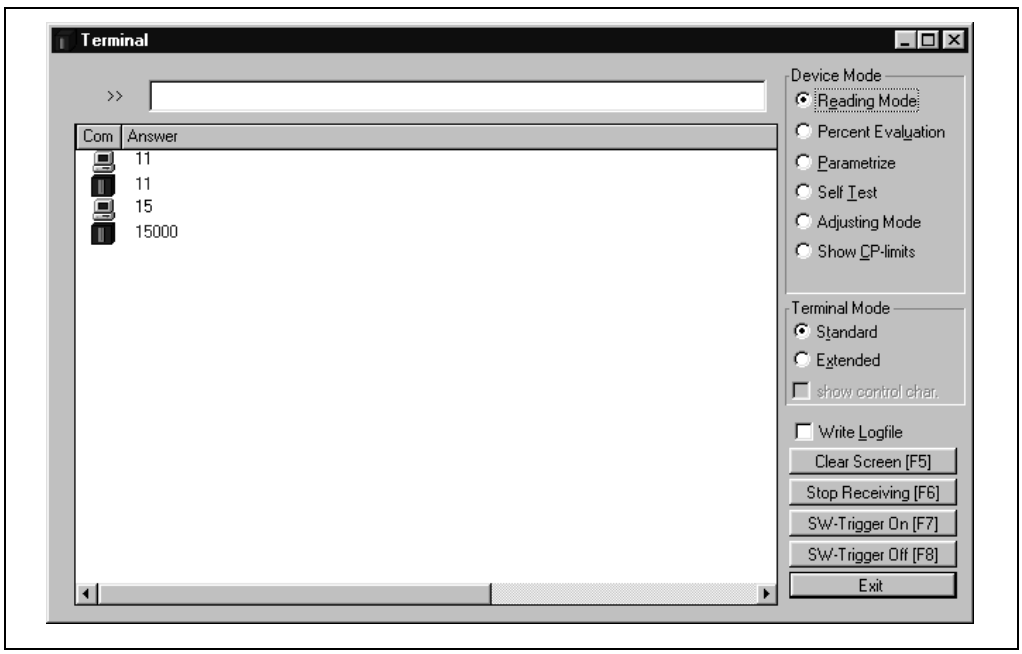

Fig. 6-15: CLV-Setup: Displaying the self-test result in the Terminal Emulator

The code number ”15**000**” means that the self-test was completed successfully and that no faults were diagnosed *Chapter 8.3.1 CLV without external parameter memory, Page 8-2*, lists the error keys together with the associated corrective measures.

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6.5.11 Executing CLV functions interactively

CLV-Setup enables a number of CLV functions to be executed interactively. CLV-Setup prompts the user to carry out specific actions and provides information on the progress of the function being executed.

The following functions are available:

- Background teach-in/reset (to default)
- Percentage evaluation
- Show CP-limits
- Adjustment mode
- Copy parameter memory
- Analyze scanner network

➢ Choose CLV 490, DEVICE FUNCTIONS and the desired function
– or –
press the [F2] key.
The EXECUTE DEVICE FUNCTIONS dialog box is then displayed.
Choose the desired function in the EXECUTE menu in the menu.

CLV-Setup starts the function and, where appropriate, prompts the user to carry out the necessary actions.

Fig. 6-16 shows an example of the dialog box that appears after Show CP-limits has been started.

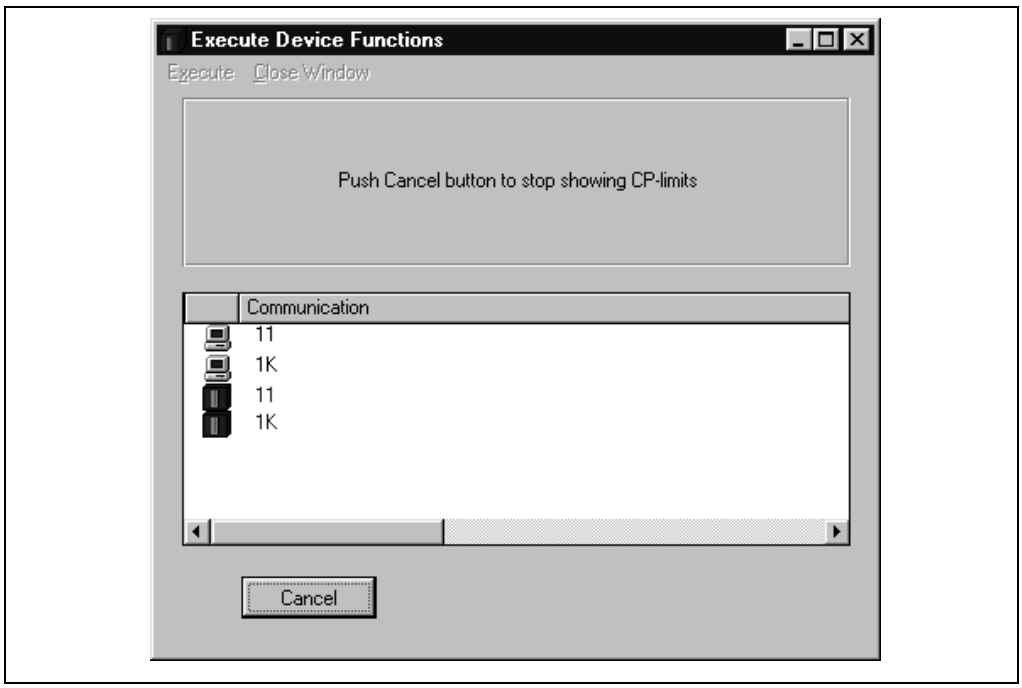

Fig. 6-16: CLV-Setup: Dialog box for executing Show limits

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6.6 CLV messages

The CLV outputs system, warning and error messages in English in response to the actions carried out by the user. The messages are output in plain text via the terminal interface only.

6.6.1 Displaying messages

Proceed as follows in order to display messages on the screen of the PC in the "CLV-Setup" program:

1. Click in the toolbar.
   The Terminal Emulator window is then displayed.
2. In the TERMINAL MODE section, choose EXTENDED.

The CLV then outputs messages in response to events that occur while the bar code is being read. The messages are only output in the **extended mode** of the Terminal Emulator!

6.6.2 System messages

System messages confirm that an action has been carried out successfully, e. g. changing the operating mode. The user is not required to carry out any further steps here.
Chapter 10.5 System messages, Page 10-40 explains the contents of the messages.

6.6.3 Warning messages

Warning messages indicate that it was not possible to perform an action or that the values set for the parameters can cause an error while the bar code is being read.

Table 6-12 lists the warning messages in alphabetical order together with the associated corrective measures.

Message	Meaning	Remedy
"Warning: Master Timeout"	The selected master timeout is too short	Optimize the master timeout using the DEVICE CONFIGURATION tab in the user interface of CLV-Setup. Perform a download to the CLV! See also *Technical Information "Master/Slave with Bar Code Scanners"*, no. 8 007 675

Table 6-12: Warning messages

6.6.4 Error messages

Error messages indicate the following types of error:

- a device defect
- incorrect parameter settings
- errors during data transmission to the host

Chapter 8.3.1 CLV without external parameter memory, Page 8-2 lists the messages in alphabetical order together with the associated corrective measures.

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6.7 Switching off the CLV

1. If the parameter set was modified in CLV-Setup or was only stored temporarily in CLV via a download, the parameter set must be stored permanently in the CLV by choosing the PERMANENT storage option.
2. Save the parameter set as a configuration file "*.scl" in CLV-Setup.
3. Switch off the power supply of the AMV/S 60 or unplug both of the CLV's connecting cables from the connection module.

The last parameter set stored permanently in the CLV remains valid.

We recommend that you print out the configuration file in order to archive the parameter set.

1. Click in the toolbar.
   The PRINT FILE dialog box is then displayed.
2. Enter a comment in the input field in order to assign the printout to the CLV.
   Confirm your entry with OK.
   The PRINT dialog box for configuring the printer is then displayed.
3. Make the necessary entries in the dialog box and confirm these.
   CLV-Setup prints out the current configuration file in the form of a table.

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7 Maintenance

7.1 Cleaning the CLV during operation

To ensure optimum reading performance, the reading window of the CLV must be clean at all times. For this reason, we recommend that you check the reading window at regular intervals, particularly if the device is operated under extreme conditions (dust, abrasion, humidity, finger prints).

Laser beam can cause blindness!

The CLV uses a class 2 red-light laser. Looking directly at the laser beam can seriously damage your eyesight.

- Never look directly into the path of the beam (similar to sunlight).
- Never look directly into the reading window while the device is in operation.
- Switch off the device while it is being cleaned.

Damage on the reading window!

The reading window is made of glass. Scratches and streaks on the window will reduce the reading performance.

- Use a mild, non-scouring detergent.
- Never use scratching or scouring motions to clean the reading window.

Cleaning the reading window:

- Clean the reading window at regular intervals with a mild, non-scouring detergent, e. g. an antistatic glass cleaning fluid. *Fig. 7-1* shows the areas that require cleaning. Use soft, lint-free cloth.
- If necessary, clean the LEDs on the rear of the device.

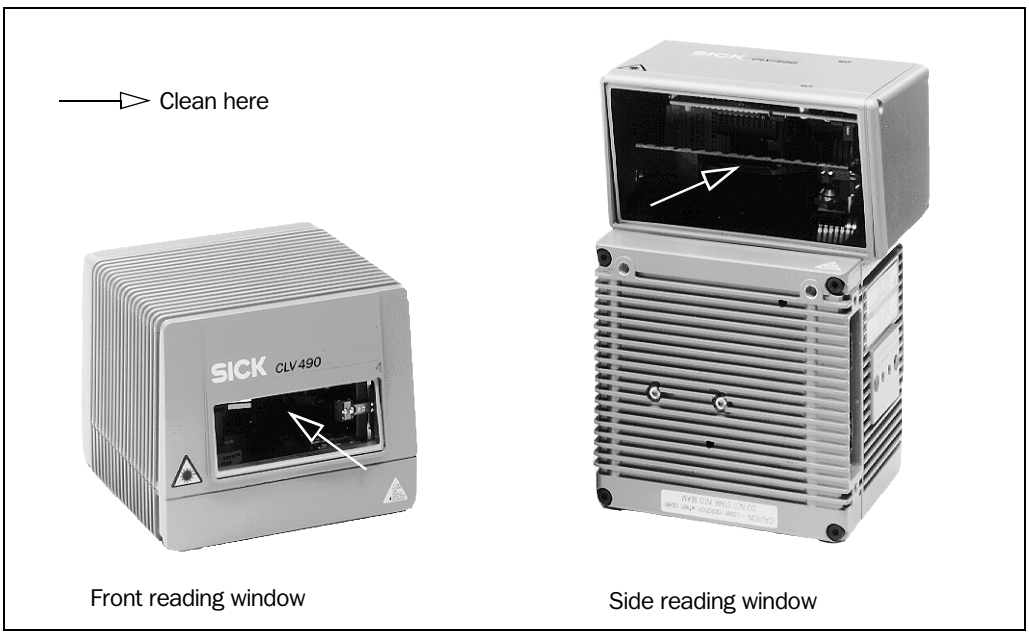

Fig. 7-1: Cleaning the reading window

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Cleaning other optical surfaces:

➢ If an external reading pulse generator and/or object-height detection sensors are used (e. g. photoelectric reflex switches), make sure to clean the relevant optical surfaces (*Fig. 7-2*). Contamination on these surfaces can cause switching errors.

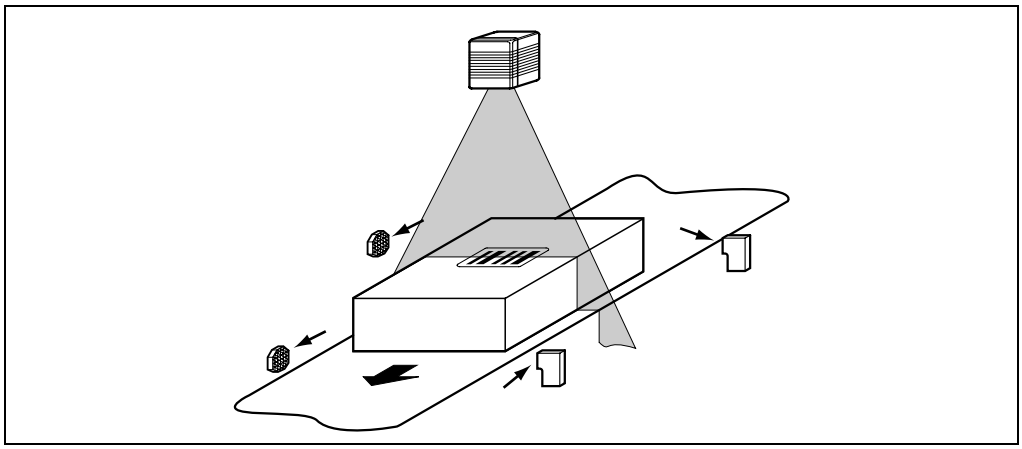

Fig. 7-2: Cleaning the external optical sensors (reading pulse generator, object-height detector)

7.2 Maintenance

The CLV does not require any maintenance. Its self-monitoring functions ensure fault-free operation over long periods of time.
Any faults or malfunctions are displayed on the terminal interface. The messages can be displayed on the screen in the extended mode of the Terminal Emulator in the "CLV-Setup" program. See *Chapter 8.3 Error messages, Page 8-2*.

7.3 Disposal

Irreparable devices or devices that are no longer required must be disposed of in an environmentally-friendly manner:

1. Always observe the applicable national waste disposal regulations.
2. Remove the CLV housing.
3. Remove the electronic modules.
4. Remove the glass panel from the reading window and send it to be recycled.
5. Send the chassis and cover (aluminium) to be recycled.
6. Send the electronic modules for disposal as problem waste.

At present, SICK AG does not accept any unusable or irreparable devices.

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8 Troubleshooting

8.1 Overview of the possible errors and malfunctions

8.1.1 Mounting errors

- CLV aligned incorrectly with the object carrying the bar code (e. g. blanking)
- Reading pulse sensor positioned incorrectly
- With event-controlled focus control: sensors for object height detection positioned incorrectly

8.1.2 Electrical installation errors

- Interfaces on the CLV connected incorrectly (wiring error in AMV/S 60)
- Host interface on AMV/S 60 configured incorrectly

8.1.3 Parameter errors

- Functions not adjusted to local conditions, e. g. communication parameters on the host interface are set incorrectly
- Technical limits of the device exceeded, e. g. relationship between the scanning frequency and the reading distance

8.1.4 Malfunctions

- Laser timeout for incorrectly terminated reading pulse
- Device error (hardware/software)

8.2 Monitoring error and malfunctions

The CLV is self-monitoring:

- After the power supply has been switched on, the CLV automatically carries out a self-test, in which it checks important hardware components, before it is initialized (parameter set loaded and device functions initialized). The self-test can be repeated at any time by cancelling Reading mode. See *Chapter 6.5.10 Self-test, Page 6-31*.
- If the CLV detects an error during the self-test or at any other time, it outputs the error status ST=3 on the host interface. Prerequisite: the error status is enabled for transmission. This is enabled by default. The CLV displays the diagnosed error as a numeric combination on the terminal interface (see *Table 8-1*).
- While it is in operation, the CLV constantly monitors the laser diode and speed of the polygon mirror wheel. In addition, a watchdog circuit responds to error statuses. CLV carries out distance measurement referencing at regular cycles. To do so, the laser diode is switched on for max. 10 s.
- A timer (laser timeout) automatically deactivates the laser diode in Reading mode ("Sensor input" and "Serial interface trigger" mode) if the reading interval has not ended after 10 minutes (default setting). However, it does not end the reading interval. In this case, the CLV outputs the message: Laser safety timeout on the terminal interface. The reading interval must be terminated by resetting the trigger signal. The laser diode is activated again by the next reading trigger.

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8.3 Error messages

The CLV outputs error message in English on the **terminal interface** only. *Table 8-1* contains a list of the messages in alphabetical order.

For warnings, see *Chapter 6.6.3 Warning messages, Page 6-33*.

Displaying messages:

To display the messages on the PC, proceed as follows:

1. Click in the toolbar.
   The Terminal Emulator is launched.
2. Click the EXTENTED option in the TERMINAL MODE section.

8.3.1 CLV without external parameter memory

Message	Meaning	Possible cause	Remedy
"CLV SYS-Failure: xxx"	The CLV has diagnosed a system error. The "Device Ready" LED does not light up or extinguishes. The system is restarted.	Error key: 1) 011 Data error (RAM) 012 Address error (RAM) 013 RAM to small 051 Speed out of tolerance (mirror wheel) 061 Mirror interval out of tolerance 071 Error: laser shutter 091...095 Error: focus control 101...118 Error: external parameter memory 130 Amplifier error 131 Background profile invalid 132 Center position CP 50 implausible 133 Brightness overflow 201...215 DSP error	If the error occurs again after the CLV is restarted, contact the SICK Service department. 1) Deactivate the CAN interface to suppress error numbers above 300 (not relevant in stand-alone mode). To do so, upload the parameter set from the CLV using CLV-Setup, choose the CAN INTERFACE tab and deactivate the function in the CAN INTERFACE FUNCTION section. Download the parameter set to the CLV!
"EEPROM Check fault, default parameters loaded"	The CLV has diagnosed an irregularity in the EEPROM and downloads the entire default settings to the RAM instead of the permanently stored application-specific parameters.	Device fault.	Contact the SICK Service department.
"EEPROM - reading fault"	The CLV cannot load the application-specific parameters, permanently stored in the EEPROM, into the RAM.	Device fault.	Contact the SICK Service department.
"EEPROM - writing fault"	The CLV cannot write the current parameters in the RAM to the EEPROM.	Device fault.	Contact the SICK Service department.
"Focus table inconsistent: defaults loaded"	The CLV has diagnosed an irregularity in the internal reference table for the focus positions selected by the user. It therefore loads the default setting of the distance configurations.	Device fault.	Contact the SICK Service department.

Table 8-1: Error messages output on the terminal interface

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Message	Meaning	Possible cause	Remedy
"Host – Receive fault"	The host has requested the data output string last sent by the CLV three times; NAK has been issued with each attempt.	• Host receive set incorrectly • Data transmission interrupted e. g. by cable break	• Check the host • Check connecting cable and monitor data transfer of the host interface. To do so, select upload from the CLV by using the "CLV-Setup" progam, select the AUXILIARY INTERFACE tab and select MONITOR HOST INTERFACE in the drop down list. Download to the CLV! Start the Terminal Emulator.
"Host - transfer to slow"	In the CLV, data is available for output faster than it is transmitted to the host.	• Baud rate too low • Incorrect protocol type selected • Protocol timeout too long for the reading pulse frequency	Check the configuration of the host interface.
"Host - transmit fault"	The CLV cannot correctly receive the data sent by the host.	• Host interface of the CLV configured incorrectly • Data transmission interrupted e. g. by cable break	• Check the CLV and host. • Check connecting cable and monitor data transmission at the host interface. To do so, upload from the CLV using the "CLV-Setup" program, choose the AUXILIARY INTERFACE tab and select MONITOR HOST INTERFACE from the drop-down list. Download to the CLV! Start the Terminal Emulator.
"Master/slave - trigger too soon"	The new reading pulse for the master is received before its timeout has elapsed.	Timeout for the master is too long	Check the coordination between reading pulse and timeout. To do so, upload from the CLV using the "CLV-Setup" program, choose the DEVICE CONFIGURATION tab and change the MASTER TIMEOUT in the SCANNER ARRANGEMENT section. Download the changes to the CLV!
"No polls?"	Network operation: the CLV is waiting for polls by the CLX 200 network controller.	• Data connecting cable interrupted • CLX 200 not ready • Incorrect device number parameterized • Inadvertently parameterized for network operation	• Check cables. • Switch on CLX 200 • Device number: 01 to 31 • Check the configuration of the host interface. To do so, upload from the CLV using the "CLV-Setup" program, choose the HOST INTERFACE tab and check the settings in the INTERFACE PROTOCOL section. Download the changes to the CLV!
"Oscillating mirror faulty"	The CLV cannot operate the oscillating mirror or cannot initialize the mirror.	Device fault.	Contact the SICK Service department.

Table 8-1: Error messages output on the terminal interface

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Message	**Meaning**	**Possible cause**	**Remedy**
"Slave string faulty"	Data transmission error between a slave and the master.	Data connecting cable interrupted.	If the error continues to occur, check the connecting cable between all devices.
"Wrong number of slaves"	During the master timeout, the master receives more or fewer reading results from the slaves than expected from the number of slaves that the master has entered.	• The parameterized number of slaves does not match the actual number of slaves connected • Timeout for the master is too short • The data connection between the slaves has been interrupted.	• Check the entered number of slaves. To do so, upload from the CLV using the "CLV-Setup" program, choose the DEVICE CONFIGURATION tab and check the NUMBER OF SLAVES in the SCANNER ARRANGEMENT section. Download any changes to the CLV! • As above, but check the timeout defined for the master • Check the cables between the slaves
"Wrong parameters – master/slave"	After selection of the master/slave function, individual parameter values, which are not compatible with the automatic settings defined for this function by the CLV, were changed subsequently	Deviations from the following settings: • Test string: no (slaves) • Aux. input: no (slaves) • Triggermode: serial interface or switching input • RK 512: without reaction telegram	Correct the settings on the DATA STRING, TERMINAL INTERFACE, DEVICE CONFIGURATION and HOST INTERFACE tabs in the "CLV-Setup" program. Download any changes to the CLV!

Table 8-1: Error messages output on the terminal interface

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8.3.2 LED error messages for the external parameter memory

The CLV also reports errors accessing the external parameter memory by means of the "Device Ready" and "Read Result" LEDs.

LED behavior	Meaning	Possible cause	Remedy
1. When the device is switched on, the "Device Ready" LED blinks for approx. 10 s and then lights up constantly.	Start option: START WITH EXTERNAL PARAMETERS. The CLV has successfully loaded the external parameter set to its RAM.	–	None
2. When the device is switched on, the Device Ready and "Read Result" LEDs blink for approx. 10 s. The "Device Ready" LED then lights up constantly.	Start option: START WITH EXTERNAL PARAMETERS. The CLV has successfully loaded the external parameter set with tolerated errors[1] to its RAM	Transfer ok, but different parameter versions in the external memory and CLV.	Upload parameter set to CLV-Setup and check parameters[1].
3. The "Device Ready" LED lights up constantly when the device is switched on.	• Start option: START WITH EXTERNAL PARAMETERS. The CLV has **not** loaded external parameter set. Instead, it has loaded the internal parameter set to its RAM. • Start option: START WITH INTERNAL PARAMETERS. The CLV has successfully loaded the internal parameter set to its RAM.	• External parameter memory not connected. • Start ok.	• OK if the device is to be operated without an external parameter memory. • Check whether the external parameter memory is connected correctly (free wiring: check wire assignment). • None.
4. When the device is switched on, the "Device Ready" LED and "Read Result" LEDs blink continuously [2].	• Start option: START WITH EXTERNAL PARAMETERS. The CLV has **not** loaded the external parameter set. Instead, it has loaded the internal parameter set to its RAM. **The CLV, however, does not output data on the host interface.**	• External parameter memory empty. • External parameter memory not connected. • The parameter set in the external memory is not from a CLV 490. • External parameter memory is defective.	• If the device is being used for the first time, data must first be loaded to the external parameter memory. See *Chapter 6.3.2 Switching the CLV with external parameter memory connected on for the first time with the factory default settings, Page 6-4*. • See *3 Remedy*. • Use the correct external parameter memory or overwrite the current one. See *4 Remedy, 1st pragraph*. • Repeat the startup procedure. If the error is still present after following *4* Remedy, *2nd and 3rd paragraph*, contact the SICK Service department.

1) The software of the parameter set in the CLV is older than that of the parameter set in the external memory: print out the parameter set using CLV-Setup. If necessary, display the ID of the unknown/errored command group(s) using the <STX> 8?ERR <ETX> command in the Terminal Emulator window of CLV-Setup. Decode the ID using the reference manual entitled Command Language of the CLV Bar Code Scanners and check the relevant parameter values in the tabs.
The software of the parameter set in the CLV is newer than that of the parameter set in the external memory: all of the new parameters in the CLV are set to the default values. If these parameters are necessary, edit the values in the relevant tabs in CLV-Setup and download them to the CLV and the external memory.

2) Flashing stops when the device switches from Reading mode to Parameter mode (e. g. during download from CLV-Setup).

Table 8-2: LED error messages for access to the external parameter memory

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LED behavior	Meaning	Possible cause	Remedy
4. When the device is swiched on, the "Device Ready" LED and "Read Result" LEDs blink continuously [2]. – continued –	• Start option: START WITH COPY INTERN –> EXTERN. The CLV was **not** able to copy the internal parameter set to the external memory. It has loaded the internal parameter set to its RAM.	• External parameter memory is not connected. • Data transmission error. • Internal parameter set too large to be copied to the external memory (memory is full). • The external parameter memory is defective.	• Ensure that the external parameter memory is connected correctly (free wiring: check wire assignment). • Repeat the startup procedure. If the error is still present after following *4* Remedy*, 2nd and 3rd paragraph*, contact the SICK Service department. • Contact the SICK Service department. • See *4 Remedy, 4th paragraph*
5. When the device is switched on, the "Device Ready" LED and "Read Result" LEDs blink alternately for approx. 10 s. The "Device Ready" LED then lights up constantly.	Start option: START WITH COPY INTERN –> EXTERN. The CLV has successfully copied the internal parameter set to the external memory [3] and set the option for the next start to START WITH EXTERNAL PARAMETERS. It has loaded the internal parameter set to its RAM.	Transfer ok.	Not applicable.

2) Flashing stops when the device switches from Reading mode to Parameter mode (e. g. during download from CLV-Setup).
3) The parameter set stored in the external memory is not checked automatically to determine whether it can be read. To check the parameter set, switch off the power supply to the CLV briefly and monitor the "Device Ready" LED as described under *1*.

Table 8-2: LED error messages for access to the external parameter memory

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8.3.3 Messages for errors accessing the external parameter memory

The CLV outputs further error messages, in addition to the general error messages in *Chapter 8.3.1 CLV without external parameter memory, Page 8-2*, if problems arise when the external parameter memory is accessed.

Message	Meaning	Possible cause	Remedy
1. "error: access to external parameters not successful, internal parameters loaded" (Error type: 104, 105, 106, 111, 112,115)	• Start option: START WITH EXTERNAL PARAMETERS. The CLV has **not** loaded the external parameter set. Instead, it has loaded the internal parameter set to its RAM. **The CLV, however, does not output data on the host interface.** • Start option: START WITH COPY INTERN –> EXTERN. The CLV was **not** able to copy the internal parameter memory. It has loaded the internal parameter set to its RAM.	The external parameter memory is defective.	Repeat the startup procedure. If the error is still present, contact the SICK Service department.
2. "error: external parameter memory empty, internal parameters loaded" (Error type: 103)	Start option: START WITH EXTERNAL PARAMETERS. The CLV has **not** loaded the external parameter set. Instead, it has loaded the internal parameter set to its RAM.	The external parameter memory is empty.	If the device is being used for the first time, data must first be loaded to the external parameter memory. See *Chapter 6.3.2 Switching the CLV with external parameter memory connected on for the first time with the factory default settings, Page 6-4*.
3. "error: external parameter memory full, internal parameters loaded" (Error type: 108)	Start option: START WITH COPY INTERN –> EXTERN. The CLV was **not** able to copy the internal parameter memory. It has loaded the internal parameter set to its RAM.	The internal parameter set is too large for the external memory (memory is full).	Contact the SICK Service department.
4. "error: external parameters not valid for device, internal parameters loaded" (Error type: 116)	Start option: START WITH EXTERNAL PARAMETERS. The CLV has **not** loaded the external parameter set. Instead, it has loaded the internal parameter set to its RAM. **The CLV, however, does not output data on the host interface.**	The parameter set in the external memory is not from a CLV 490.	Use the correct external parameter memory or overwrite the current one. See *2 Remedy*.
5. "error: no external parameter memory connected, internal parameters loaded" (Error type: 102)	• Start option: START WITH EXTERNAL PARAMETERS. The CLV has **not** loaded the external parameter set. Instead, it has loaded the internal parameter set to its RAM. • Start option: START WITH COPY INTERN –> EXTERN. The CLV was **not** able to copy the internal parameter set to the external memory. It has loaded the internal parameter set to its RAM.	• External parameter memory not connected. • External parameter memory not connected.	• OK if the device is to be operated without an external parameter memory. • Check whether the memory is connected correctly (free wiring: check wire assignment). • See *5 Remedy 2nd paragraph*

Table 8-3: Messages for problems accessing the external parameter memory

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Message	Meaning	Possible cause	Remedy
6. "error: writing parameters CLV -> EXT, internal parameters loaded" (Error type: 110, 111, 112)	Start option: START WITH COPY INTERN –> EXTERN. The CLV was **not** able to copy the internal parameter set to the external memory. It has loaded the internal parameter set to its RAM	Data transmission error.	Check whether the external parameter memory is connected correctly (free wiring: check wire assignment). Repeat the startup procedure. If the error is still present, contact the SICK Service department.
7. "warning: additional unknown parameter(s), external parameters loaded" (Error type: 101, 114)	Start option: START WITH EXTERNAL PARAMETERS. The CLV has successfully loaded the external parameter set with tolerated errors[1)] to its RAM.	Transfer ok but different parameter versions in the external memory and the CLV.	Upload the parameter set to CLV-Setup and check the values[1)]. 1) see footnote 1) in *Table 8-2, Page 8-5*

Table 8-3: Messages for problems accessing the external parameter memory

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8.4 ST error status in the reading result of a bar code

Value	Meaning	Possible cause	Remedy
0	Good Read.	–	None
1	Incorrect check digit.	The check digit calculated by the CLV during the reading process does not match that printed in the bar code.	Check whether the check digits in the bar code and generated by the print process are correct.
2	No bar code of the enabled code type found according to the evaluation criteria.	• No bar code in the CLV's reading field during the reading pulse • Code type/length in the CLV not enabled for decoding • Reading window obstructed/dirty	• Synchronize the pulse of the CLV with the entry of a bar code into the reading field. • Correct the code configuration parameters. • Check the reading window.
3	Device fault.	Device fault.	Call up the self-test. See *Chapter 6.5.10 Self-test, Page 6-31*. If result ≠ 15000: Contact the SICK Service department.
5	Required number of successful multiple reads for the bar code not reached.	• Conveyor speed of the object is too high • Scanning frequency is too low • Ladder-type arrangement for bar code relative to the conveyor direction: code height (bar length) too poor • Print quality too poor	• Check the conveyor speed. • Adjust the scanning frequency. • Check the code height. • Check the print quality.
6	Master: Number of slave reading results does not match the parameterized number of slaves.	• The parameterized number of slaves does not match the actual number of slaves available • The master timeout is too short • The data connection between the slaves and/or the master has been interrupted	• Check the entered number of slaves. • Check the master timeout setting. • Check the cables between the slaves and the master.
7	The source of the reading result is the auxiliary input via the terminal interface.	The bar code was not detected by the reading function of the CLV, but was entered subsequently with the auxiliary function of the terminal interface and sent to the host in a separate data string.	–
9	The OUTPUT FILTER function is activated for the code comparison. The CLV has detected valid bar codes. However, these do not match the active match code(s).	The scanned object does not have a bar code that matches the specified match code.	–
A	The CHECK MAX. NUMBER OF CODES function is active. The number of valid bar codes detected by the CLV in Reading mode exceeds that specified under NUMBER OF CODES: MAXIMUM . It repeatedly outputs the defined error string until the number specified under NUMBER OF CODES: MINIMUM is reached.	One object in a set of objects with a constant number of bar codes, for example, contains more bar codes than defined in the application.	This message is used to indicate errors on the objects (e. g. check whether objects are homogeneous: mixed with incorrect objects).
D	The CODE 32 evaluation option is activated for Code 39. The CLV is attempting to interpret 6-digit C39 bar codes as C32 bar codes (output as 9-digit decimal values).	The read 6-digit bar code is not a C32 bar code. The CLV outputs the defined error string instead.	–

Table 8-4: Meaning of the ST error status in the reading result

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8.5 Troubleshooting

The following are required for troubleshooting purposes using the tables below:

- These Operating Instructions
- Tools
- A tape measure (up to 3 000 mm)
- A digital measuring device (current/voltage measurement)
- A PC running CLV-Setup
- RS 232 data connection cable (pins 2 and 3 crossed), e. g. no. 2 014 054

8.5.1 General malfunctions: CLV not ready

Malfunction	Possible cause	Remedy
The "Device Ready" LED is not lit. The "Result 1" output is not outputting a pulse (default setting: Device Ready)	After switching on the power supply: • The CLV has no power	• Check wiring (power connector fitted securely to the AMV/S 60 Connection Module). Measure voltage at pin 1 and pin 5.
	• The CLV has diagnosed a device error during the self-test	• Switch CLV off and on again. Does the LED light up? If not, contact SICK Service department
	During operation: • The CLV is not in "Reading" mode	• Return to Reading mode using the "CLV-Setup" program. See *Chapter 6.5.1 Reading mode (standard operating mode), Page 6-19*
	• The CLV has deactivated the laser diode 10 min. (default setting) after the start of the current reading pulse (trigger mode: sensor input/serial interface)	• Terminate reading pulse. Check the reading pulse function. Supply new pulse. See *Table 6-9, Page 6-16*,

Table 8-5: Troubleshooting: restoring operation (Reading mode)

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8.5.2 Malfunctions in Reading mode: reading trigger errors

➢ Check whether the "Device Ready" LED lights up.
If the LED does not light, see *Table 8-5, Page 8-10*.

Malfunction	Possible cause	Remedy
1. Trigger mode: **Sensor input** (external sensor). The CLV cannot be clocked: – the "Sensor" LED does not light up – the scan lines don't appear	• Sensor not connected or connected to incorrect switching input. • If sensor supplied by CLV: sensor not connected to ground potential • Incorrect reading pulse source parameterized in the CLV • Photoelectric switch not aligned with the reflector (photoelectric proximity switch/ inductive sensor not dampened)	• Connect sensor to "Sensor" switching input. Check sensor wiring (see *Fig. 5-4, Page 5-16*). Measure output signal on sensor. • Insert jumper between pin 5 and pin 15 • In the "CLV-Setup" program: choose the DEVICE CONFIGURATION tab, READING TRIGGER Mode section: Sensor input selected? (active high: reading pulse starts when power applied) • Align sensor. Check functioning
2. Trigger mode: **Serial interface** The CLV cannot be clocked: – the Sensor LED does not light up – the scan line does not appear	• Incorrect reading pulse source parameterized on the CLV • The CLV is not receiving any command strings to start the reading interval on the data interface	• In the "CLV-Setup" program: choose the DEVICE CONFIGURATION tab, READING TRIGGER Mode section: is serial interface selected? SERIAL INTERFACE section: is trigger type correct? • Check data connection to host. In the "CLV-Setup" program: choose the HOST INTERFACE tab. In DATA FORMAT section: are the correct interface type (hardware) and data format selected? INTERFACE PROTOCOL section: are the correct start and stop characters selected? Use the "CLV-Setup" program to check the host command strings: choose AUXILIARY INTERFACE tab. Choose MONITOR HOST INTERFACE function. See *Chapter 6.5.8 Monitor Host Interface, Page 6-29*. Download temporarily to the CLV.
3. CLV does not respond to an external signal that ends the reading pulse (sensor input, serial interface)	Incorrect end of reading pulse parameterized on the CLV	In the "CLV-Setup" program: choose the DEVICE CONFIGURATION tab, click the EDIT READING TRIGGER button. END OF READING INTERVAL section: is generated by Trigger Source selected?

Table 8-6: Troubleshooting: reading trigger errors in Reading mode

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8.5.3 Malfunctions in Reading mode: result output errors

➢ Check whether the "Device Ready" LED lights up.
If the LED does not light, see *Table 8-5, Page 8-10*.

Here: number of bar codes to be read = 1

Malfunction	Possible cause	Remedy
1. The "Read Result" LED (default setting: Good Read) does not light up at the end of the reading pulse.	• Read not successful, since there was no bar code in the reading field during the reading pulse	• Synchronize read with presence of an object in reading field. See *Chapter 8.5.2 Malfunctions in Reading mode: reading trigger errors, Page 8-11*
– The "Result 2" switching output (default setting: Good Read) is not outputting a pulse – The CLV outputs status ST=2 in the reading result on the host interface	• Scan line positioned incorrectly	• Align CLV. Is bar code at center of scan line? Check the reading quality with the "CLV-Setup" software. Choose PERCENTAGE EVALUATION. See *Chapter 6.5.2 Percentage evaluation, Page 6-22*
	• Evaluation range of the scan line is limited unfavourable (CP values)	• In the "CLV-Setup" program: choose the READING CONFIGURATION tab, click the EDIT AUTOFOCUS respectively DISTANCE CONFIGURATION/ASSIGMENT TABLE button. Are the min. and max. code position values correct? Check with SHOW CP-LIMITS. See *Chapter 6.5.5 Show CP-limits, Page 6-26*
	• Bar code presented at incorrect reading distance	• Check whether reading distance of bar code is in the specified reading range?
	• The presented bar code's module width cannot be read by the CLV type being used	• Present a bar code with an acceptable module width. See *Chapter 9 Technical data, Page 9-1*
	• With event-controlled focus control: wrong focus position in Distance Configuration choosen.	• In the "CLV-Setup" program: choose the READING CONFIGURATION tab, click the DISTANCE CONFIGURATION/ASSIGNMENT TABLE button. Does the focus position match the distance of the object?
	• With event-controlled focus control: trigger source parameterized incorrectly.	• In the "CLV-Setup" program: choose the READING CONFIGURATION tab, in the FOCUS TRIGGER section. a) Trigger source "Switching input": Check functional assignment of IN 3 and IN 4 and connection of the sensors. See *Fig. 5-5, Page 5-17* b) Trigger source: "Serial interface": Check the data connection to the host. Use the "CLV-Setup" program to check the host command strings: choose AUXILIARY INTERFACE tab. Choose MONITOR HOST INTERFACE function. See *Chapter 6.5.8 Monitor Host Interface, Page 6-29*. Download temporarily to CLV! c)Trigger source: Timer: Check switchover time
	• The bar code is tilted excessively with respect to the scan line	• In the "CLV-Setup" program: choose the CODE CONFIGURATION tab, DECODER section: choose SMART decoder. Download all changes to CLV!

Table 8-7: Troubleshooting: result output errors in Reading mode

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Malfunction	Possible cause	Remedy
1. The "Read Result" LED default setting: Good Read) does not light up at the end of the reading pulse: *– continued –*	• The reading angles at which the bar code appears to the CLV are too large	• In the "CLV-Setup" program: choose the CODE CONFIGURATION tab, DECODER section: choose Standard decoder. Download temporarily to CLV! Start PERCENTAGE EVALUATION, choose DISTANCE CONFIGURATION. Monitor reading quality (reading quality > 70 %!). If necessary, realign CLV and/or reconfigure distance config- uration. If ok, choose SMART DECODER. Download to CLV.
	• Bar code in total reflection zone	• Optimize CLV alignment (scan line should strike the bar code at a skew of approx. 15°) Use the "CLV-Setup" program to check the quality of the read. Start PERCENTAGE EVALUATION. See *Chapter 6.5.2 Percentage evaluation, Page 6-22*
	• Evaluation criteria for bar code incorrect	• In "CLV-Setup" program: choose the READING CONFIGURATION tab, CODES section. Enable all code types (except Pharmacode), set code lengths to FREE. Download temporarily to CLV! Start PERCENTAGE EVALUATION. Code type and length are displayed in the reading result. Enable recorded code type in the CODES section and disable all other types. Enter the code length under FIXED on the code type tab. Download to CLV!
	• Bar code quality inadequate	• Check: sufficient blank zones present? Print contrast adequate? Specified print tolerances exceeded? In the "CLV-Setup" program: choose READING CONFIGURATION tab, SEGMENTATION section. Is START/STOP selected? Perform read with reference code.
2. The CLV is not transferring any reading results to the host	• Reading pulse is not functioning correctly	• See *Chapter 8.5.2 Malfunctions in Reading mode: reading trigger errors, Page 8-11*
	• Wiring fault in data connection	• Check wiring as shown in *Fig. 5-2, Page 5-14*
	• Voltage level incorrect	• Measure voltages
	• Host interface in CLV parameterized incorrectly	• In "CLV-Setup" program: choose HOST INTERFACE tab, DATA FORMAT section. Are the interface type (hardware) and data format correct? Check settings in INTERFACE PROTOCOL section.
3. The CLV transfers the status ST=3 to the host in the reading result	The CLV has diagnosed a device error in the selftest	Switch the CLV off and on again. Does the "Device Ready" LED light up? If not, contact the SICK Service department.

Table 8-7: Troubleshooting: result output errors in Reading mode

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Malfunction	Possible cause	Remedy
4. The data content of the bar code output by the CLV is incorrect or incomplete	• The data format on the host interface is parameterized incorrectly in the CLV • The CLV suppresses the last character in the bar code	• In the "CLV-Setup" program: choose the HOST INTERFACE tab, DATA FORMAT section. Are the values correct? • In the "CLV-Setup" program: choose the CODE CONFIGURATION tab. Click the EDIT CODES button. Choose the tab for the relevant code. Is the TRANSMIT CHECK DIGIT checkbox activated? Change if necessary. Download to CLV!

Table 8-7: Troubleshooting: result output errors in Reading mode

8.5.4 Malfunctions in Reading mode: errors in the result status output

➢ Check whether the "Device Ready" LED lights up.
If the LED does not light, see *Table 8-5, Page 8-10* .

Malfunction	Possible cause	Remedy
The – "Result 1" (default setting: Device Ready) – "Result 2" (default setting: Good Read) – "Result 3" (default setting: No Read) – "Result 4" (default setting: Match 1) switching outputs are not outputting any pulses	• The event associated with the assigned function for outputting the result status of the read does not occur in the reading operation • Incorrect switching mode parameterized in the CLV	• Not applicable. • In the "CLV-Setup" program: choose the DEVICE CONFIGURATION tab. Click the EDIT RESULT OUTPUTS button. Are the outputs set to NO INVERT OUTPUT? Change if necessary. Download to CLV!

Table 8-8: Troubleshooting: errors in the result status output in Reading mode

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8.5.5 Malfunctions in Reading mode: oscillating mirror errors

➢ Check whether the "Device Ready" LED lights up.
If the LED does not light, see *Table 8-5, Page 8-10*.

Malfunction	Possible cause	Remedy
1. The oscillating mirror does not move.	Incorrect operating mode set on the CLV	In the "CLV-Setup" program choose the OSCILLATING MIRROR tab, OSCILLATING MIRROR section. Is OSCILLATING WITH MAXIMUM AMPLITUDE or OSCILLATING WITH VARIABLE AMPLITUDE selected?
2. The oscillating mirror oscillates with maximum deflection (40 CW), even though a variable amplitude, e. g. 10 CW, is set in the distance configuration 1	• OSCILLATING WITH MAXIMUM AMPLITUDE set on the CLV by mistake	• From the OSCILLATING MIRROR tab, choose OSCILLATING WITH VARIABLE AMPLITUDE. Download to the CLV!
	• The oscillating amplitude is paramterized in the wrong distance configuration (here: no. 2)	• In the "CLV-Setup" program: choose the READING CONFIGURATION tab, click the DISTANCE CONFIGURATION/ASSIGNMENT TABLE button. Is the amplitude value set in the correct distance configuration (here: no. 1)?
	• The distance configuration (focus position) was not changed	• In the "CLV-Setup" program: choose the DEVICE CONFIGURATION tab. Assignment IN 3 and IN 4: is dynamic focus control selected? Connect sensors to the switching inputs. Check sensor wiring (see *Fig. 5-5, Page 5-17*). Measure output signal at sensor
3. One-Shot: The One-Shot function cannot be triggered (sensor correctly connected to the "IN 3" or "IN 4" switching input)	Trigger source incorrectly parameterized and/or "IN 3" or "IN 4" switching input has not been assigned this function.	In CLV-Setup: choose the OSCILLATING MIRROR tab. Trigger mode ok? Choose DEVICE CONFIGURATION tab. Assignment IN 3 or IN 4: is trigger One-Shot selected?

Table 8-9: Troubleshooting: oscillating mirror errors in Reading mode

8.6 SICK Support

If a system error occurs repeatedly ("CLVSYS-Failure: xxx", xxx= 000 ... 299) or if you cannot correct an error using the above measures, the CLV may be defective. The CLV does not contain any components that can be repaired by the user.

Please contact your local SICK office or subsidiary. The telephone and fax numbers are listed on the *back page* of this manual.

➢ Please contact SICK before sending the device for repair.

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Notes

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9 Technical data

9.1 Data sheet CLV 490-0010/-2010/-6010 bar code scanner

Type	**CLV 490-0010** (Standard density)	**CLV 490-2010** (High density)	**CLV 490-6010** (Low density)
Design	**line scanner (standard device), without heater**		
Reading window	front		
Laser diode (wave length)	red light (λ = 650 nm)		
Service life of laser diode	MTBF 20 000 h		
Laser class	Class 2 (pursuant to DIN EN 60825-1), shutoff of laser diode after 10 min[1)]		
Focus Control	Autofocus, alternatively event-controlled focus control		
No. of distance configurations (DC)	max. 8		
Focus adjustment time	≤ 20 ms (typically)		
Focus trigger source	"IN 0 ... IN 4" switching inputs/data interface/timer		
Useful aperture angle	max. 60° (front reading window)		
Scanning/decoding frequency	600 ... 1 200 Hz		
Resolution (typically)	0.25 ... 1.0 mm	0.17 ... 0.4 mm	0.35 ... 1.2 mm
Reading ranges	see *Page 10-3*	see *Page 10-16*	see *Page 10-27*
Bar code print contrast (PCS)	≥ 60 %		
Ambient light compatibility	2 000 lx (on bar code)		
No. of bar codes per scan	1 ... 12 (standard decoder), 1 ... 5 (SMART decoder)		
No. of bar codes per reading interval [2)]	1 ... 50 (autodiscriminating)		
Bar code types (SMART decoder)	Code 39, Code 128, Code 93, Codabar, EAN, EAN 128, UPC, 2/5 Interleaved		
Bar code length	max. 50 characters (max. 600 characters across all bar codes per reading interval)		
Print ratio	2:1 ... 3:1		
No. of multiple reads	1 ... 99		
Optical indicators	4 x LEDs (status indicators)		
Reading pulse	"Sensor" switching input/Free-running/Serial interface/OPC/OTC		
"Host" data interface	RS 232 or RS 422/485, variable data output format		
Data transmission rate	300 ... 57 600 bit/s		
Protocols	SICK Standard, SICK Network and 3 964(R)		
Physical configurations	Stand-alone, SICK Network (Bus), Daisy Chain (Pass-Through or Master/Slave)		
"CAN" data interface	CANopen protocol, CAN scanner network		
Data transmission rate	10 kbit/s ... 1 Mbit/s		
"Terminal" data interface	RS 232, 9 600 bit/s, 8 data bits, no parity, 1 stop bit, fixed output format		
Switching inputs	6 (Sensor, "IN 0 ... IN 4") – optodecoupled, V_{imax} = +30 V, non-interchangeable, can be connected to PNP outputs – "Sensor" (reading pulse): max. internal delay 30 ms, reduced max. 2 ... 6 ms – "IN 0 ... IN 4": focus position switching, IN 3 and IN 4: selectable function, max. internal delay 30 ms		
Switching outputs	4 ("Result 1" ... "Result 4") – PNP, short-circuit-proof, variable pulse duration (static; resolution 10... 990 ms or 100 ... 9 900 ms) – Variable output function for result status		
Electrical connections	1 x 15-pin D Sub HD plug, 1 x 15-pin D Sub HD socket		
Operating voltage/power consumption	18 ... 30 V DC/ typically 9 W, max. 16 W		
Housing	Aluminium die-cast, does not represent a problem in paint shops		

1) Default setting, in Reading mode with the "Switching input sensor" and "Serial interface pulse" types.

2) Reading interval: time window generated internally for evaluating the code.

Table 9-1: Technical specifications of the CLV 490-0010/-2010/-6010

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Type	**CLV 490-0010** (Standard density)	**CLV 490-2010** (High density)	**CLV 490-6010** (Low density)
Enclosure rating/protection class	IP 65[3] (to DIN 40 050)/class 3(to VDE 0106/IEC 1010-1)		
EMC/vibration/shock tested	to EN 50081-1, 50082-2/IEC 68-2-6 Test FC/to IEC 68-2-27 Test EA		
Weight	approx. 1.5 kg		
Ambient operating/storage temperature	0 ... +40 °C/–20 ... +70 °C		
Max. rel. humidity	90 %, non condensing		
3) With plug cover or plug cover with parameter memory			

Table 9-1: Technical specifications of the CLV 490-0010/-2010/-6010

9.2 Data sheet CLV 490-1010/-3010/-7010 bar code scanner

Technical data as CLV 490-0010/-2010/-6010 with the following exceptions:

Type	**CLV 490-1010** (Standard density)	**CLV 490-3010** (High density)	**CLV 490-7010** (Low density)
Design	**line scanner with oscillating mirror**		
Reading window	side		
Angle of emergence	105° (center position CW = 50)		
Trigger source for focus control	also: oscillating mirror reversal points		
Useful aperture angle	max. 50°		
Oscillating mirror functions	permanent (variable position)/oscillating (amplitude per DC variable or fixed)/One-Shot[1]		
Oscillating frequency	0.2 ... 4 Hz		
Max. angle of deflection	max. ±20° (±40 CW), (set with software)		
Reading ranges	see *Page 10-9*	see *Page 10-21*	see *Page 10-31*
Deflection ranges	see *Page 10-15*	see *Page 10-26*	see*Page 10-33*
Operating voltage/power consumption	18 ... 30 V DC/ typically 9 W, max 18 W		
Weight	approx. 2.2 kg		
[1] One-Shot: one-off oscillating movement per reading pulse (start position and velocity can be selected for forward and return phase)			

Table 9-2: Technical specifications of the CLV 490-1010/-3010/-7010

9.3 Data sheet CLV 490-0011 /-2011/-6011 bar code scanner

Technical data as CLV 490-0010/-2010/-6010 with the following exceptions:

Type	**CLV 490-0011** (Standard density)	**CLV 490-2011** (High density)	**CLV 490-6011** (Low density)
Design	**line scanner with heater**		
Switching on function/temperature graph	see *Chapter 10.4 Optional heating, Page 10-38*		
Power-on delay	35 ... 40 min (at 24 V DC and min. ambient operating temperature –35 °C)		
Operating voltage	24 V DC +20 %/–10 %		
Power consumption	typically 75 W, max 90 W		
Required cross-section	min. 0.5 mm² (for power supply)		
Weight	approx. 1.5 kg		
Ambient operating/storage temperature	–35 ... +35 °C/–20 ... +70 °C		

Table 9-3: Technical specifications of the CLV 490-0011/-2011/-6011

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9.4 Data sheet CLV 490-1011/-3011/-7011 bar code scanner

Technical data as CLV 490-1010/-2010/-6010 with the following exceptions:

Type	**CLV 490-1011** (Standard density)	**CLV 490-3011** (High density)	**CLV 490-7011** (Low density)
Design	**line scanner with oscillating mirror and heater**		
Switching on function/temperature graph	see *Chapter 10.4 Optional heating, Page 10-38*		
Power-on delay	35 ... 40 min (at 24 V DC and min. ambient operating temperature –35 °C)		
Operating voltage	24 V DC +20 %/–10 %		
Power consumption	typically 75 W, max 90 W		
Required cross-section	min. 0.5 mm² (for power supply)		
Weight	approx. 2.2 kg		
Ambient operating/storage temperature	–35 ... +35 °C/–20 ... +70 °C		

Table 9-4: Technical specifications of the CLV 490-1011/-3011/-7011

9.5 Dimensioned drawings – CLV

9.5.1 Line scanner (standard device) without /with heater

CLV 490-0010
CLV 490-0011
CLV 490-2010
CLV 490-2011
CLV 490-6010
CLV 490-6011

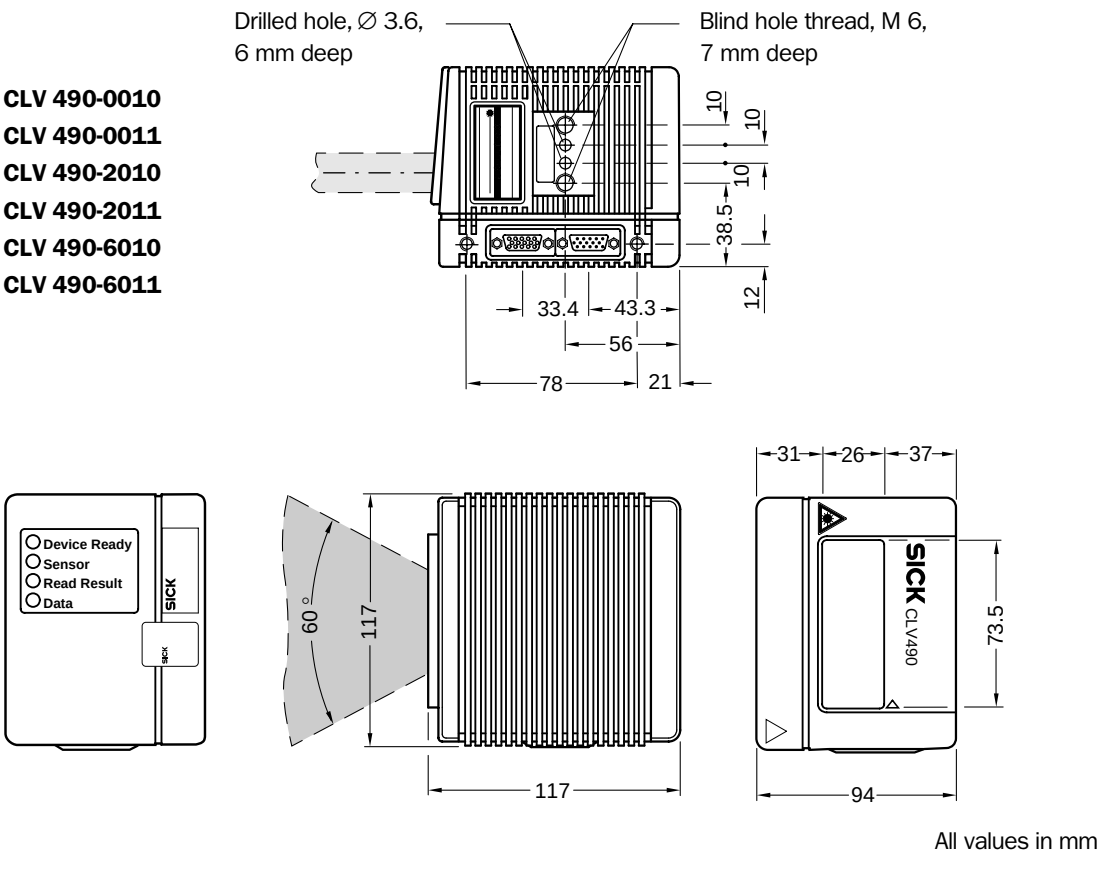

Fig. 9-1: Dimensions of the CLV 490 line scanner, front reading window

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9.5.2 Line scanner with oscillating mirror (without/with heater)

CLV 490-1010
CLV 490-1011
CLV 490-3010
CLV 490-3011
CLV 490-7010
CLV 490-7011

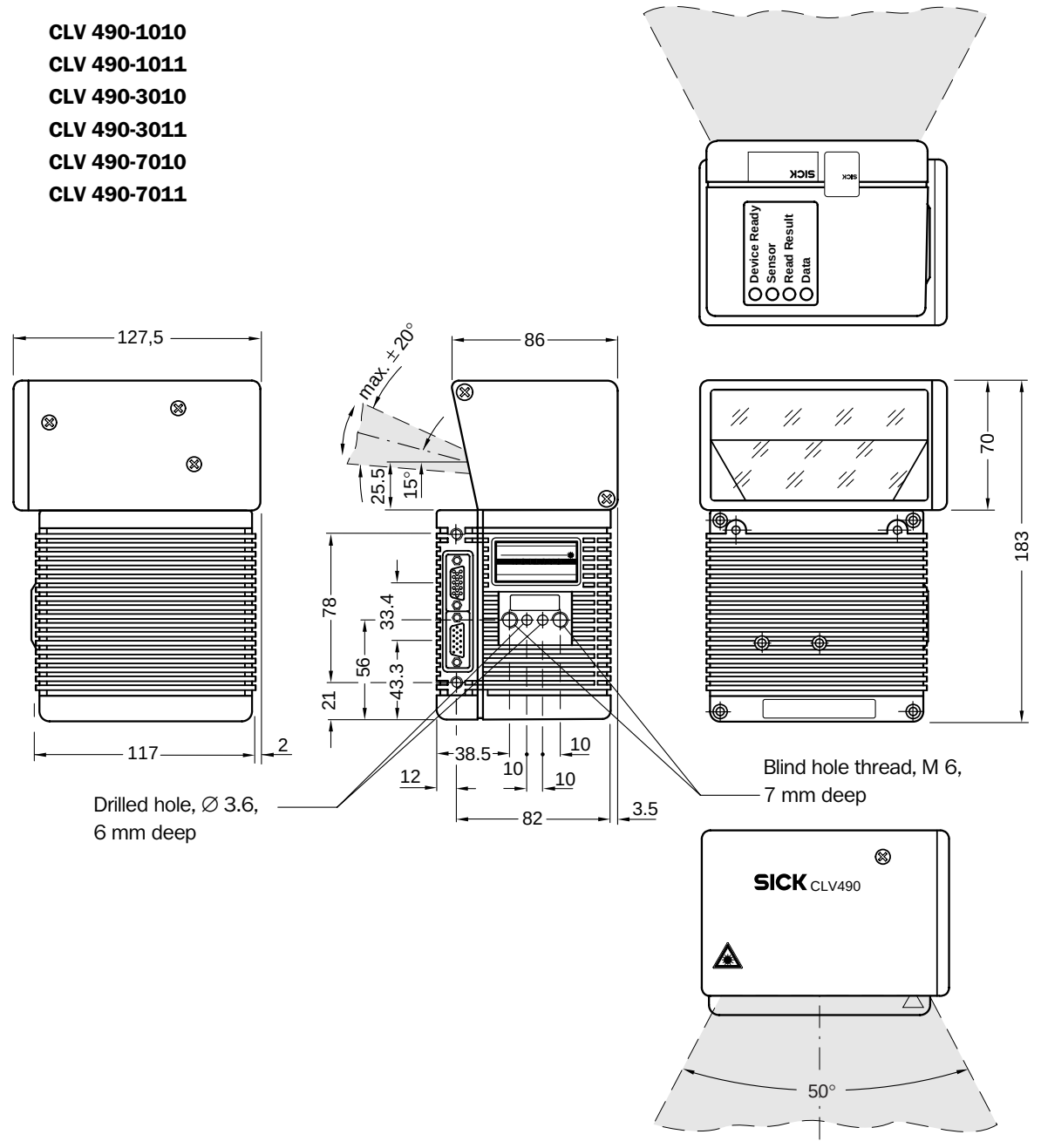

Fig. 9-2: Dimensions of the CLV 490: line scanner with oscillating mirror, side reading window

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10 Appendix

10.1 Overview

The appendix contains the following additional information:

- Specification diagrams
  - Line scanner (all variants)
  - Line scanner with oscillating mirror (all variants)
- Installation and operating instructions for the external parameter memory
- Optional heating (temperature graph/ switching on function)
- System messages
- Installation and operating instructions for the PC-based "CLV-Setup" program
- Configuring a CLV using command strings
- Parameter value calculations for configuring the CLV
- Tables
- Discussion of a parameterization example
- Special applications and procedures
- Instructions for replacing a CLV (copying the parameter set)
- Accessories
- Dimensioned drawings of the accessories
- Notes on supplementary documentation
- Glossary
- Copy of the EC-Declaration of Conformity
- Index
- Scannable sample bar codes

10.2 Specification diagrams

10.2.1 Reading conditions for all diagrams

Test code	Code 128
Print ratio	> 90 %
Tilt	±45°
Ambient light	< 2 000 lx
Good Read rate	> 75 %

Table 10-1: Reading conditions for specification diagrams

Note The min. and max. reading distances are measured radially by the CLV.

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10.2.2 Overview of diagrams

Line scanner

CLV-Type	Resolution	Scanning method	Diagram	Page
CLV 490-0010/-0011	Standard density	Line scanner	Reading field height/resolution as a function of reading distance	*10-3*
CLV 490-0010/-0011	Standard density	Line scanner	Min. and max. reading distance (DOF) for 0.35 mm/40°	*10-4*
CLV 490-0010/-0011	Standard density	Line scanner	Min. and max. reading distance (DOF) for 0.35 mm/56°	*10-5*
CLV 490-0010/-0011	Standard density	Line scanner	Min. and max. reading distance (DOF) for 0.50 mm/40°	*10-6*
CLV 490-0010/-0011	Standard density	Line scanner	Min. and max. reading distance (DOF) for 0.50 mm/56°	*10-7*
CLV 490-0010/-0011	Standard density	Line scanner	Characteristics field scanning frequency	*10-8*
CLV 490-2010/-2011	High density	Line scanner	Reading field height/resolution as a function of reading distance	*10-16*
CLV 490-2010/-2011	High density	Line scanner	Min. and max. reading distance (DOF) for 0.25 mm/40°	*10-17*
CLV 490-2010/-2011	High density	Line scanner	Min. and max. reading distance (DOF) for 0.35 mm/40°	*10-18*
CLV 490-2010/-2011	High density	Line scanner	Min. and max. reading distance (DOF) for 0.35 mm/56°	*10-19*
CLV 490-2010/-2011	High density	Line scanner	Characteristics field scanning frequency	*10-20*
CLV 490-6010/-6011	Low density	Line scanner	Reading field height/Tilt as a function of reading distance for 0.5 mm	*10-27*
CLV 490-6010/-6011	Low density	Line scanner	Min. and max. reading distance (DOF) for 0.5 mm/40°	*10-28*
CLV 490-6010/-6011	Low density	Line scanner	Min. and max. reading distance (DOF) for 0.5 mm/60°	*10-29*
CLV 490-6010/-6011	Low density	Line scanner	Characteristics field scanning frequency	*10-30*

Table 10-2: Overview of specification diagrams for the line scanner

Line scanner with oscillating mirror

CLV-Type	Resolution	Scanning method	Diagram	Page
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Reading field height/resolution as a function of reading distance	*10-9*
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.35 mm/40°	*10-10*
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.35 mm/50°	*10-11*
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.50 mm/40°	*10-12*
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.50 mm/50°	*10-13*
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Characteristics field scanning frequency	*10-14*
CLV 490-1010/-1011	Standard density	L.s. with osci. mirror	Deflection range	*10-15*
CLV 490-3010/-3011	High density	L.s. with osci. mirror	Reading field height/resolution as a function of reading distance	*10-21*
CLV 490-3010/-3011	High density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.25 mm/40°	*10-22*
CLV 490-3010/-3011	High density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.35 mm/40°	*10-23*
CLV 490-3010/-3011	High density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.35 mm/50°	*10-24*
CLV 490-3010/-3011	High density	L.s. with osci. mirror	Characteristics field scanning frequency	*10-25*
CLV 490-3010/-3011	High density	L.s. with osci. mirror	Deflection range	*10-26*
CLV 490-7010/-7011	Low density	L.s. with osci. mirror	Reading field height/Tilt as a function of reading distance for 0.5 mm	*10-31*
CLV 490-7010/-7011	Low density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.5 mm/40°	*10-28*
CLV 490-7010/-7011	Low density	L.s. with osci. mirror	Min. and max. reading distance (DOF) for 0.5 mm/50°	*10-29*
CLV 490-7010/-7011	Low density	L.s. with osci. mirror	Characteristics field scanning frequency	*10-32*
CLV 490-7010/-7011	Low density	L.s. with osci. mirror	Deflection range	*10-33*

Table 10-3: Overview of specification diagrams for the line scanner with oscillating mirror

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10.2.3 Standard density: Reading performance data of line scanner

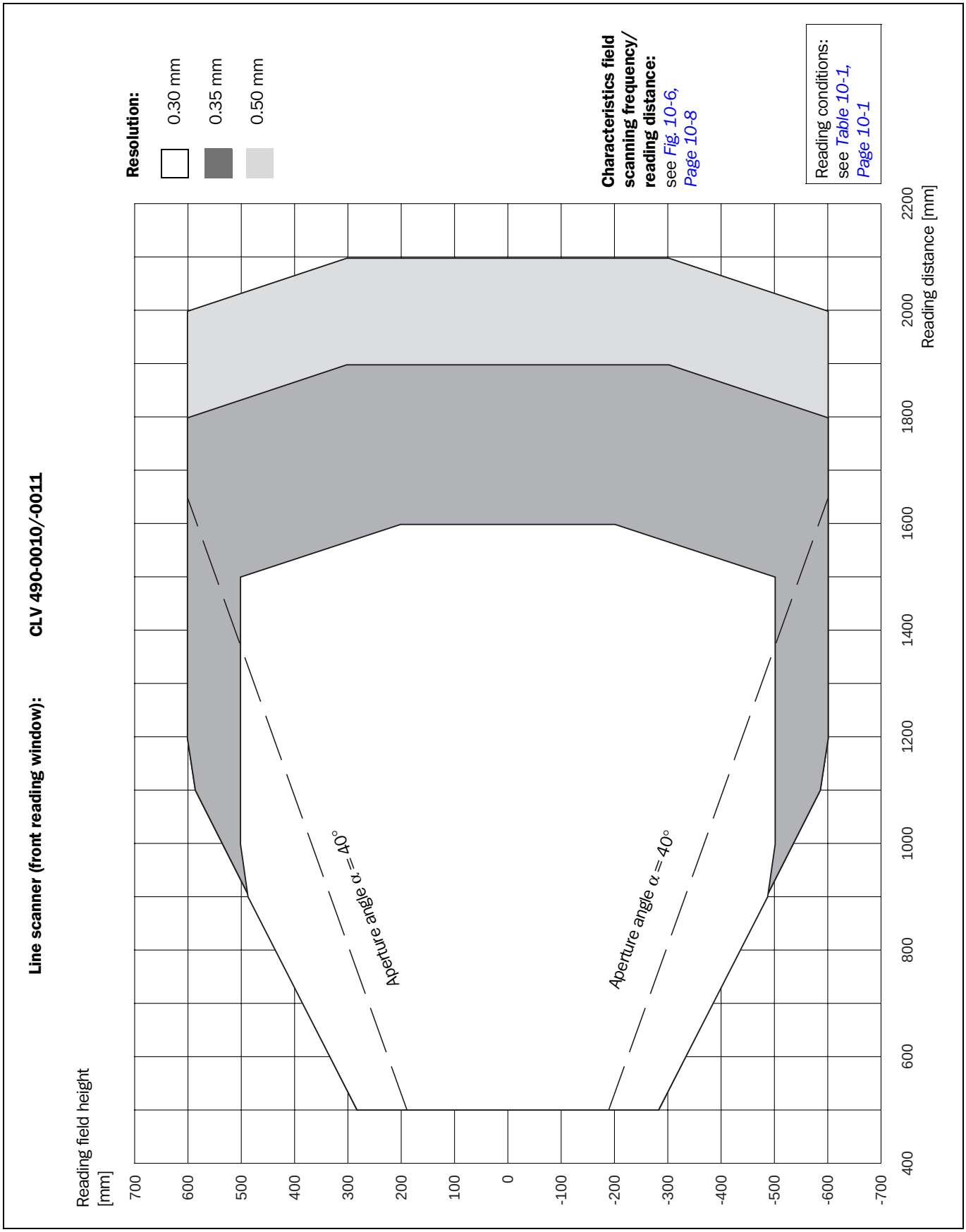

Fig. 10-1: CLV 490-0010/-0011 (Standard density): Reading field height as a function of the reading distance and resolution

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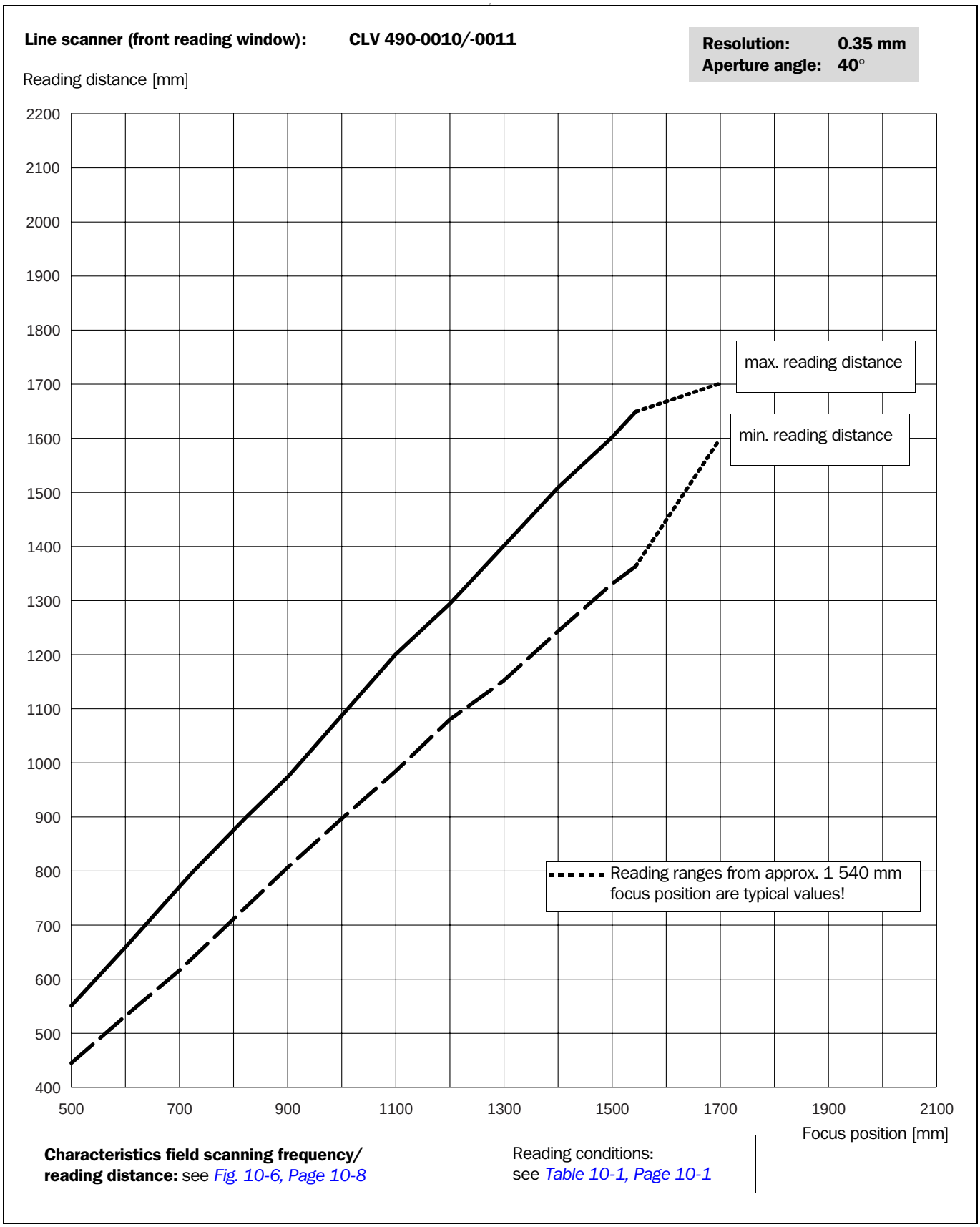

Fig. 10-2: CLV 490-0010/-0011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 40°$

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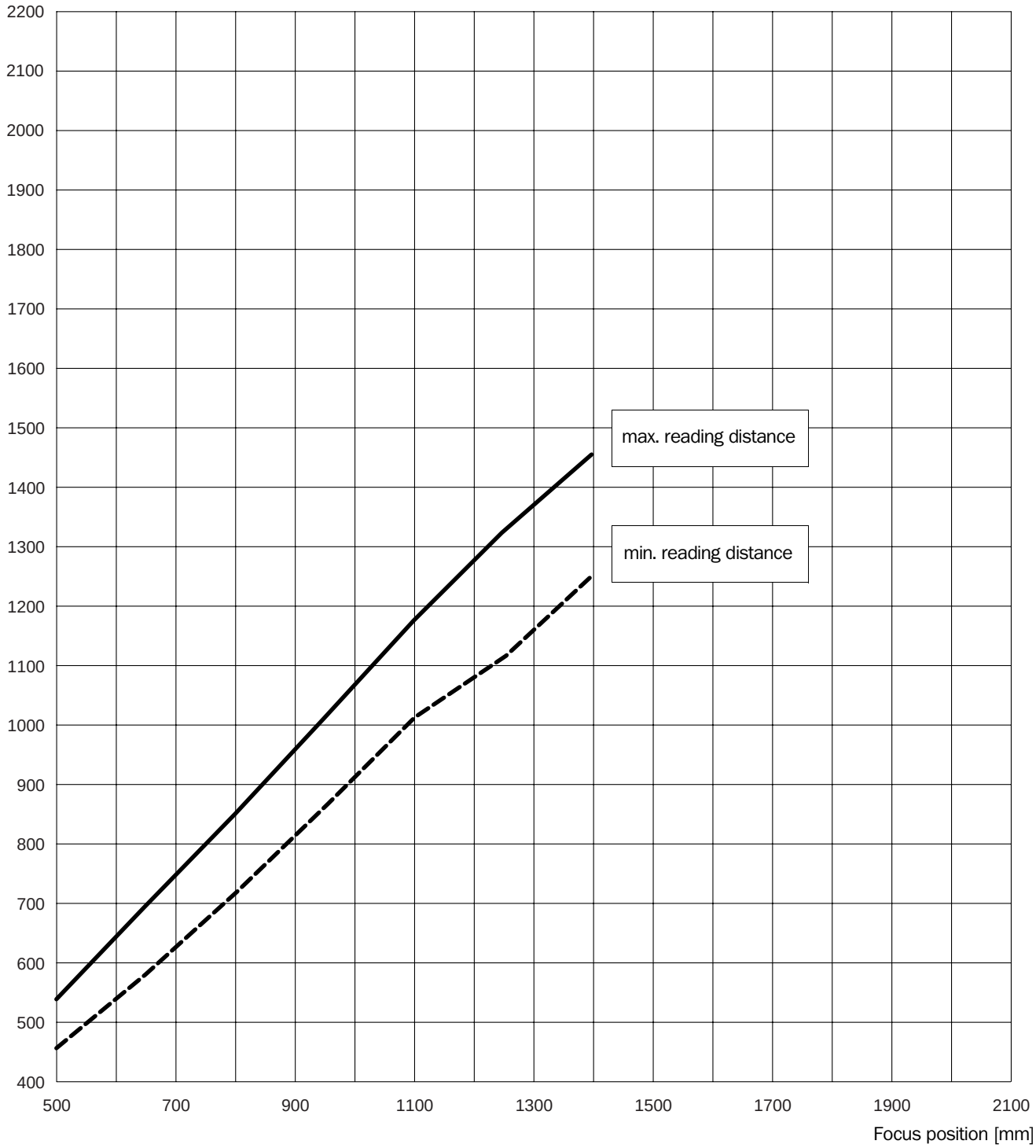
Line scanner (front reading window): **CLV 490-0010/-0011**

Resolution: **0.35 mm**
Aperture angle: **56°**



Characteristics field scanning frequency/ reading distance: see *Fig. 10-6, Page 10-8*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-3: CLV 490-0010/-0011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 56°$

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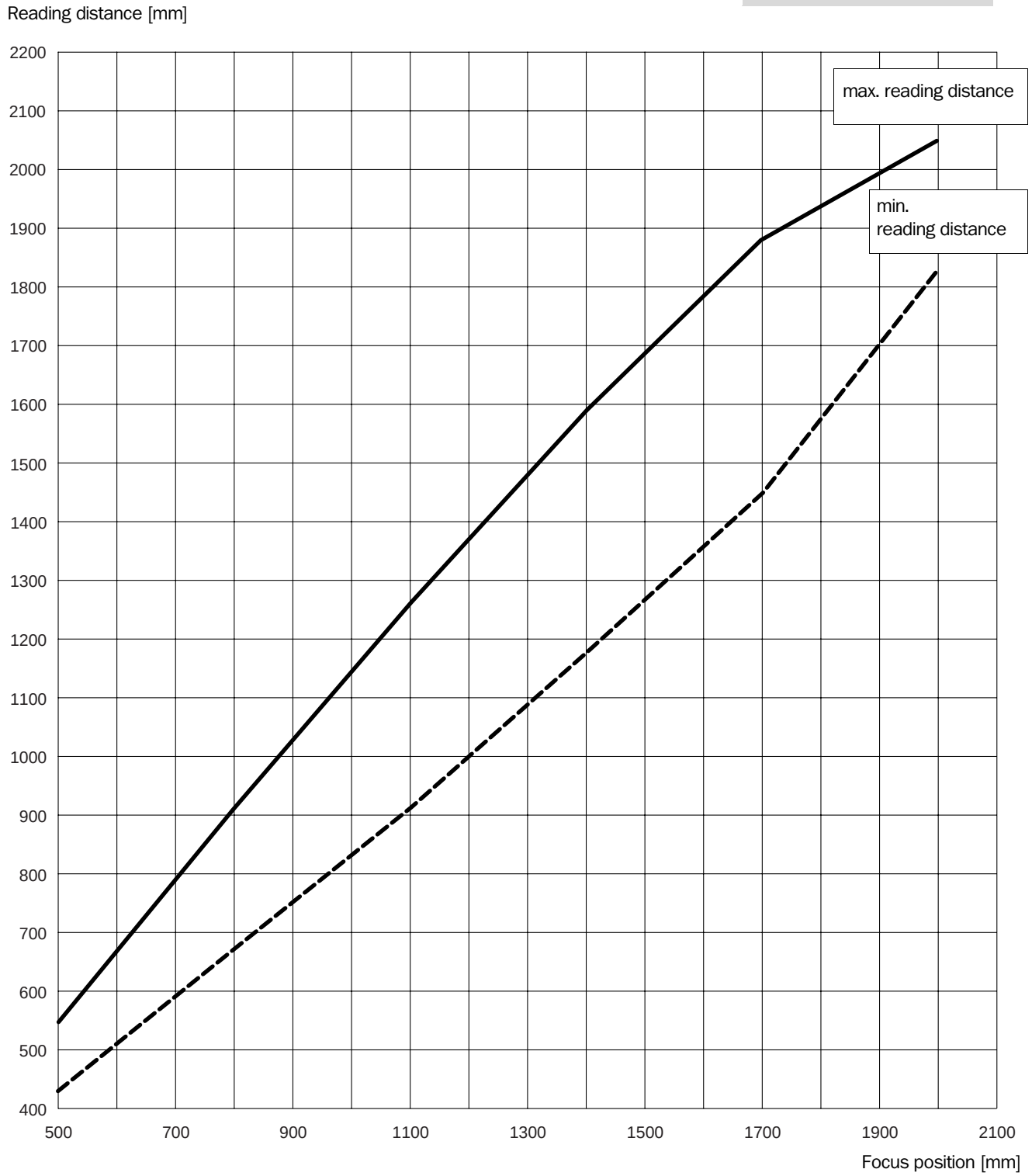
Line scanner (front reading window): **CLV 490-0010/-0011**

Resolution: **0.50 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Fig. 10-6, Page 10-8*

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-4: CLV 490-0010/-0011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm and an aperture angle of $\alpha = 40°$

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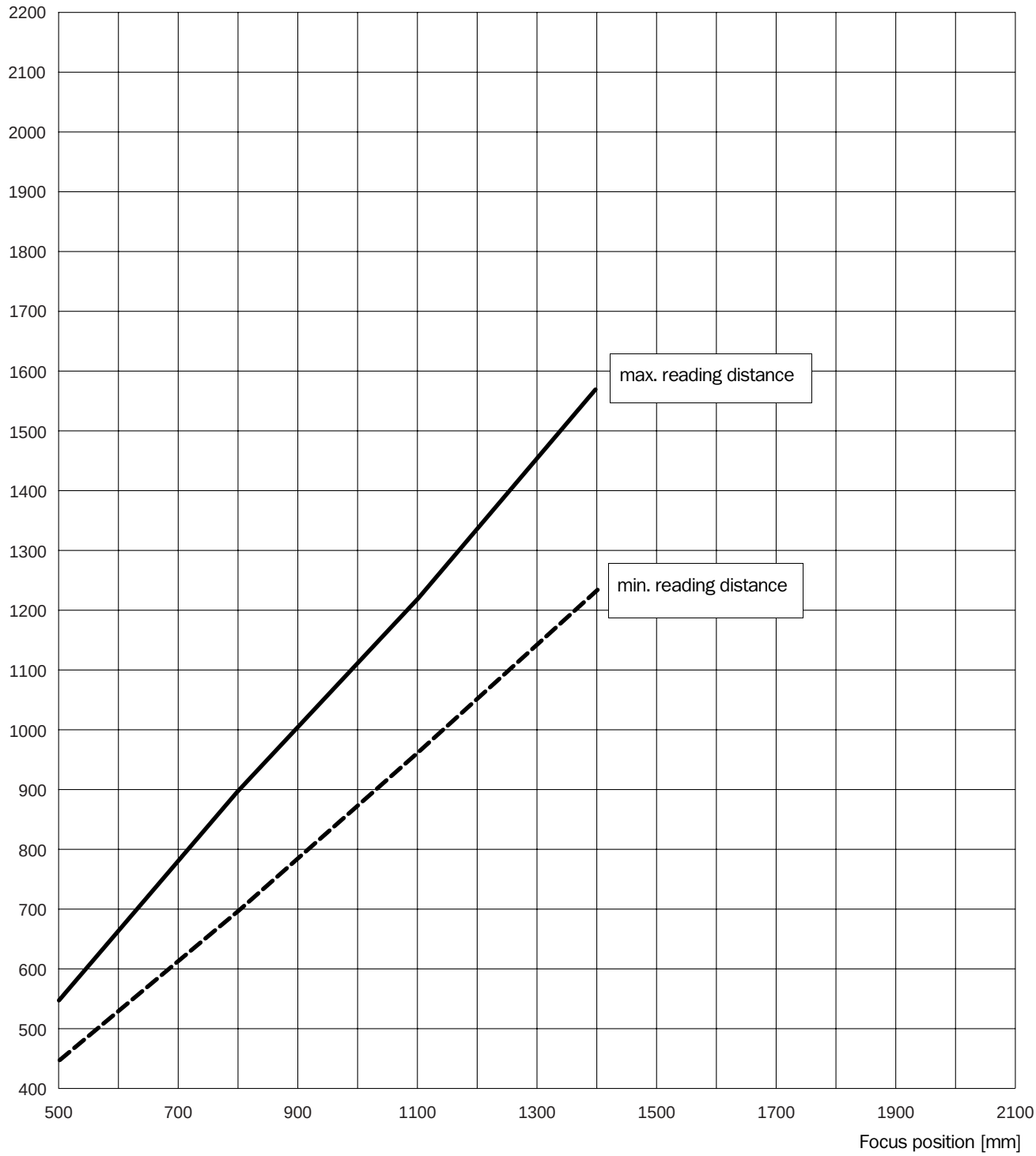
Line scanner (front reading window): **CLV 490-0010/-0011**

Resolution: **0.50 mm**
Aperture angle: **56°**



Characteristics field scanning frequency/ reading distance: see *Fig. 10-6, Page 10-8*

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-5: CLV 490-0010/-0011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm and an aperture angle of $\alpha = 56°$

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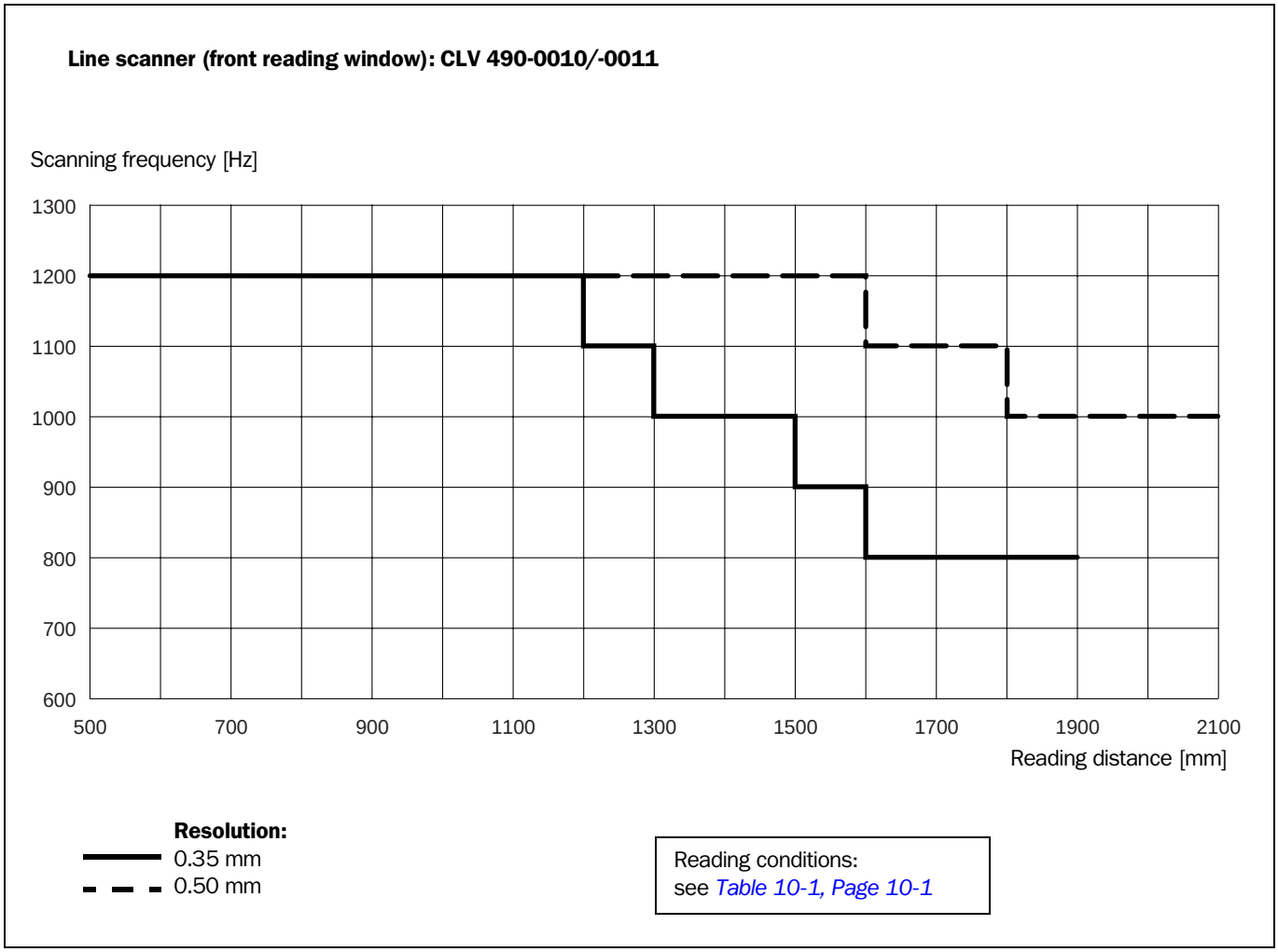

Fig. 10-6: Characteristics field CLV 490-0010/-0011: Scanning frequency as a function of the reading distance and resolution

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10.2.4 Standard density: Reading performance data of line scanner with oscillating mirror

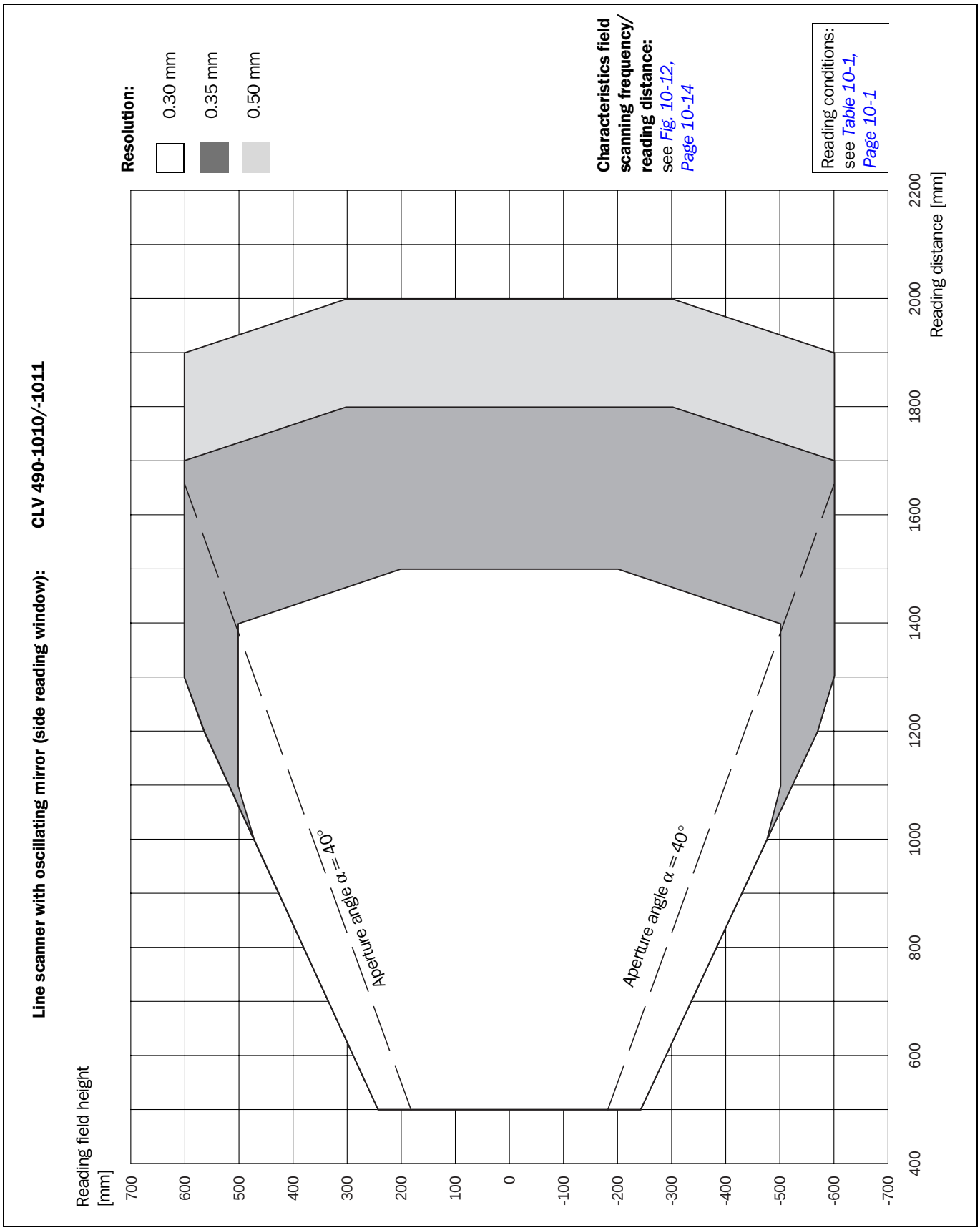

Fig. 10-7: CLV 490-1010/-1011 (Standard density): Reading field height as a function of the reading distance and resolution

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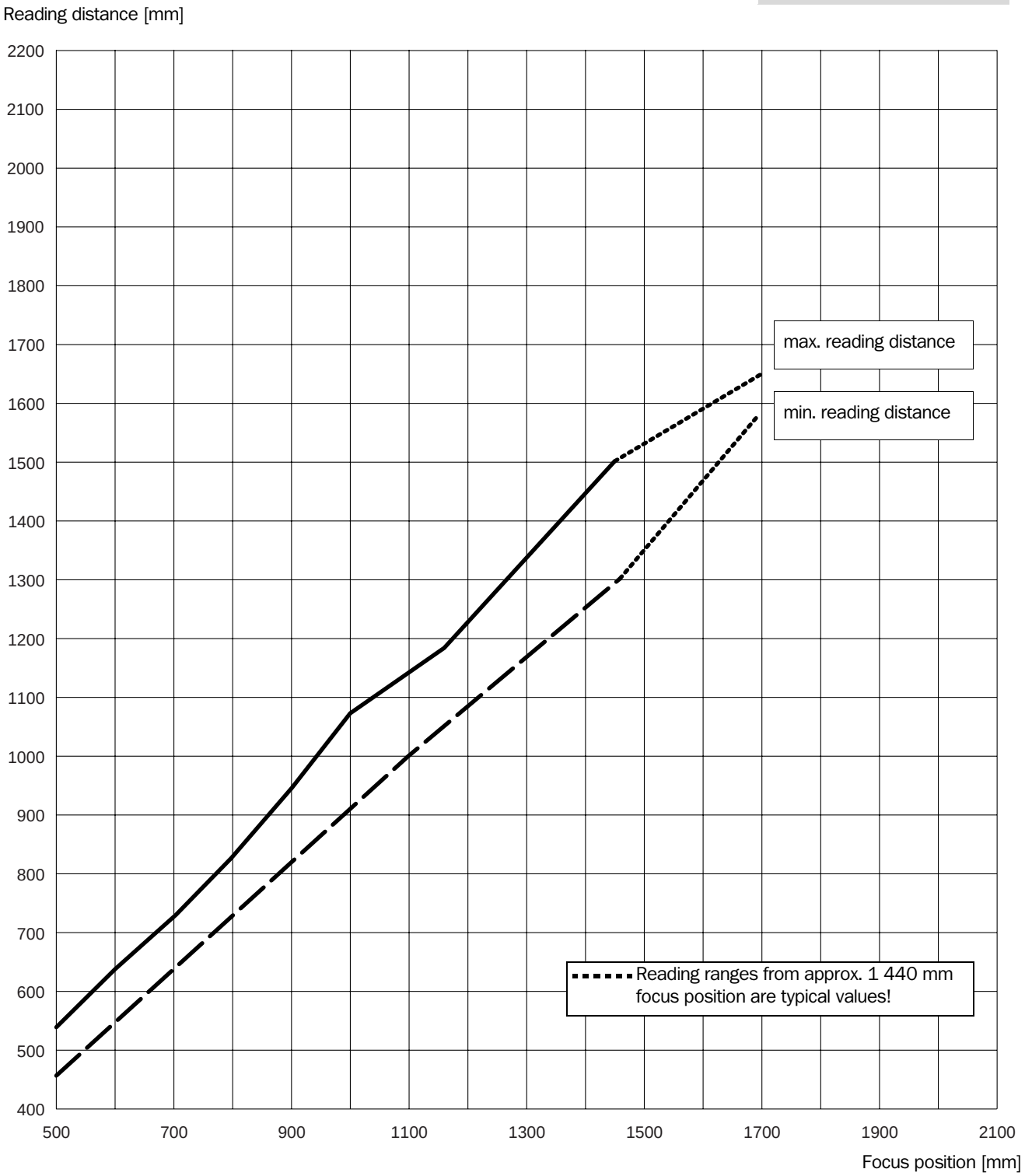
Line scanner with oscillating mirror (side reading window): CLV 490-1010/-1011

Resolution: **0.35 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Fig. 10-12, Page 10-14*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-8: CLV 490-1010/-1011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 40°$

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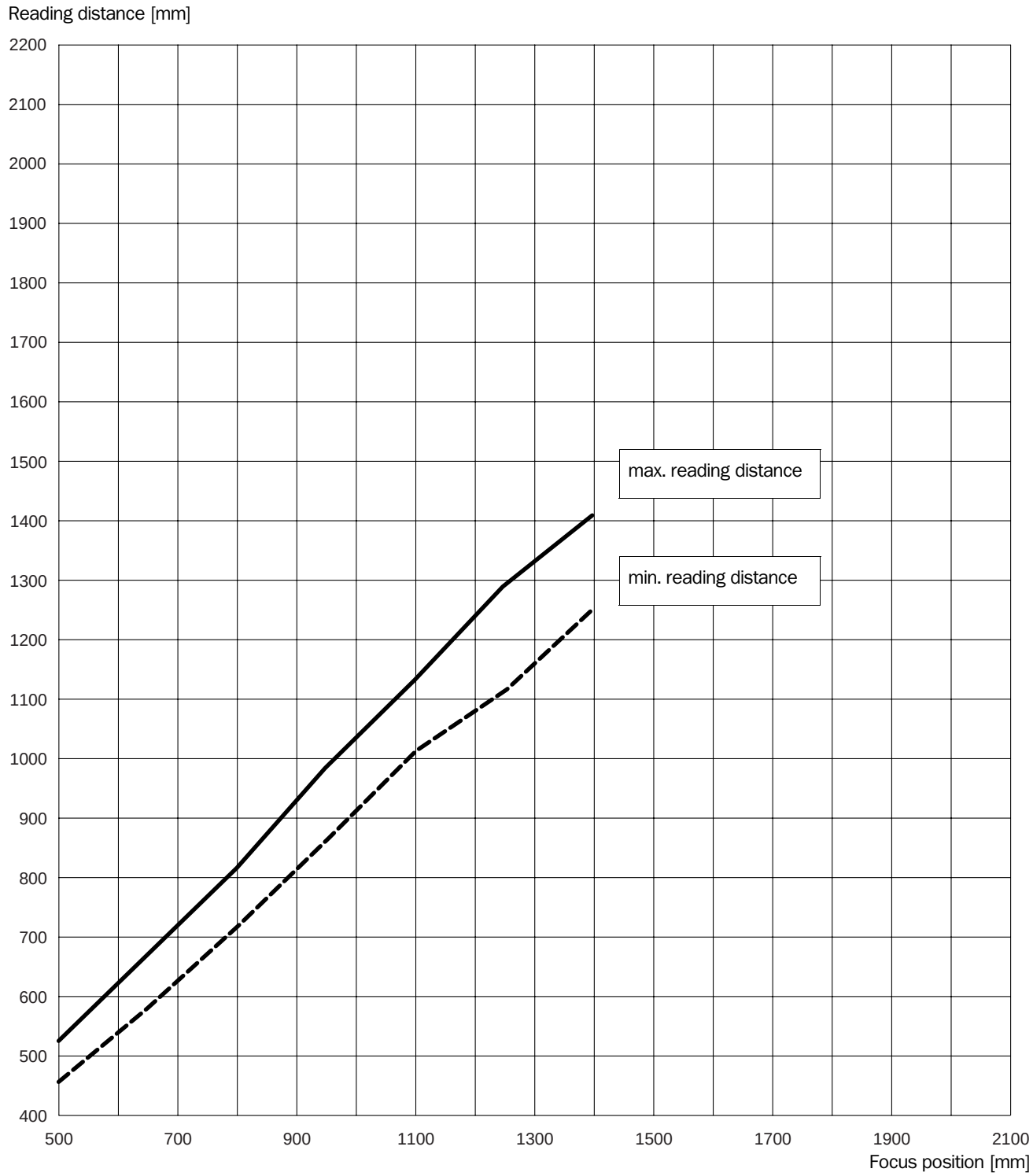
Line scanner with oscillating mirror (side reading window): CLV 490-1010/-1011

Resolution: **0.35 mm**
Aperture angle: **50°**



Characteristics field scanning frequency/ reading distance: see *Fig. 10-12, Page 10-14*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-9: CLV 490-1010/-1011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 50°$

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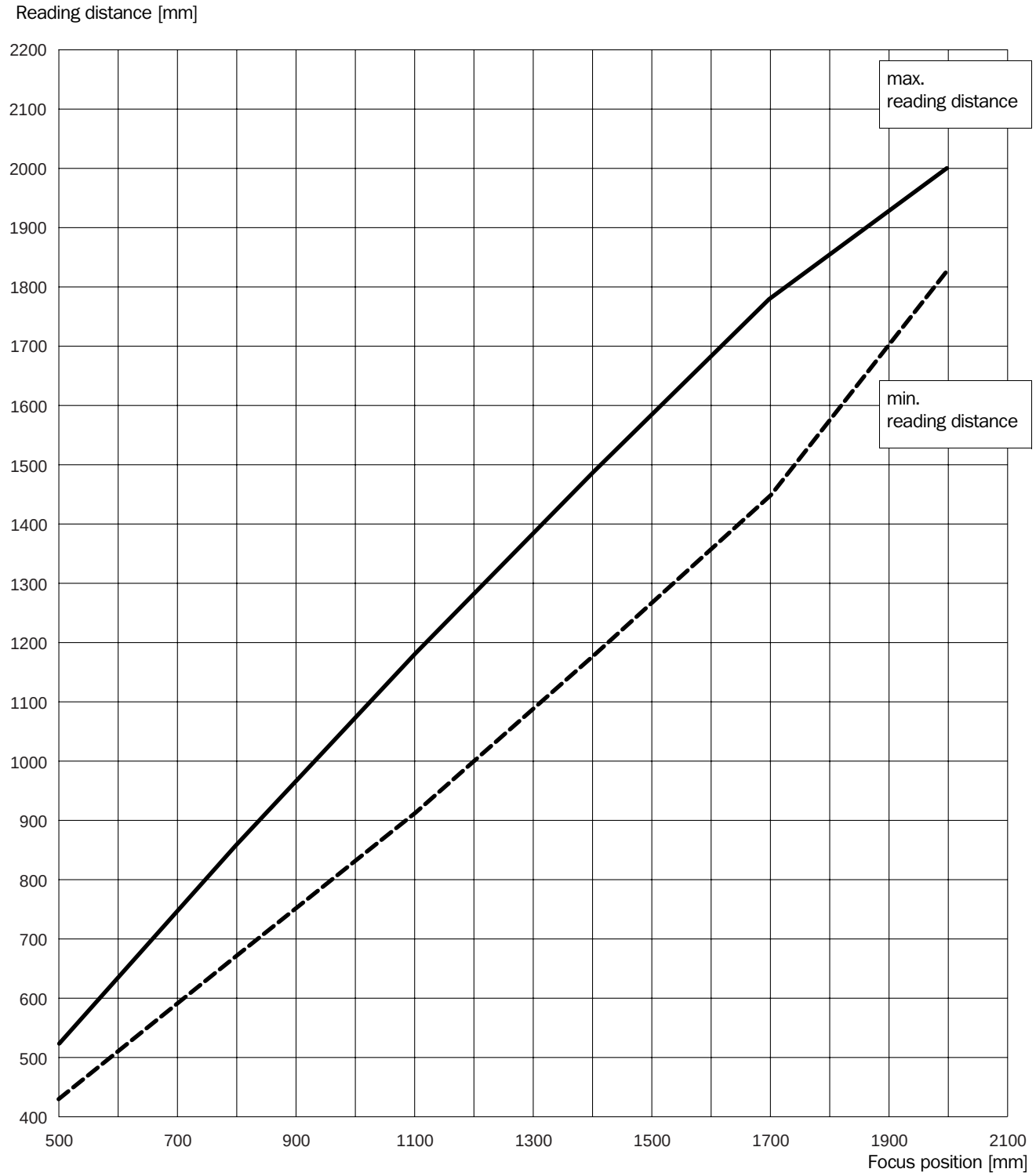
Line scanner with oscillating mirror (side reading window): CLV 490-1010/-1011

Resolution: 0.50 mm
Aperture angle: 40°



Characteristics field scanning frequency/ reading distance: see *Fig. 10-12, Page 10-14*

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-10: CLV 490-1010/-1011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm and an aperture angle of $\alpha = 40°$

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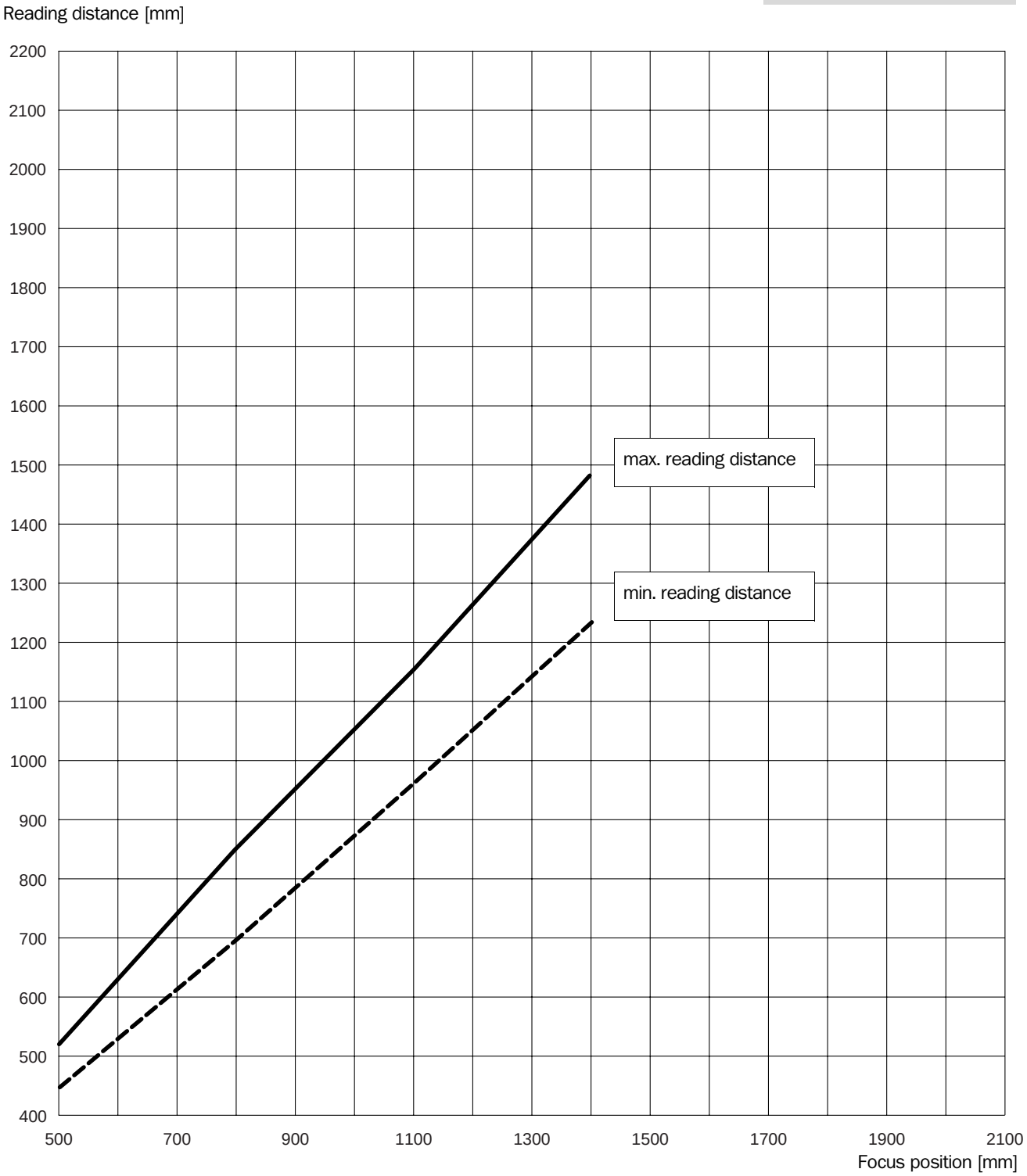
Line scanner with oscillating mirror (side reading window): CLV 490-1010/-1011

Resolution: **0.50 mm**
Aperture angle: **50°**



Characteristics field scanning frequency/ reading distance: see *Fig. 10-12, Page 10-14*

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-11: CLV 490-1010/-1011 (Standard density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm and an aperture angle of $\alpha = 50°$

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Line scanner with oscillating mirror (side reading window): CLV 490-1010/-1011

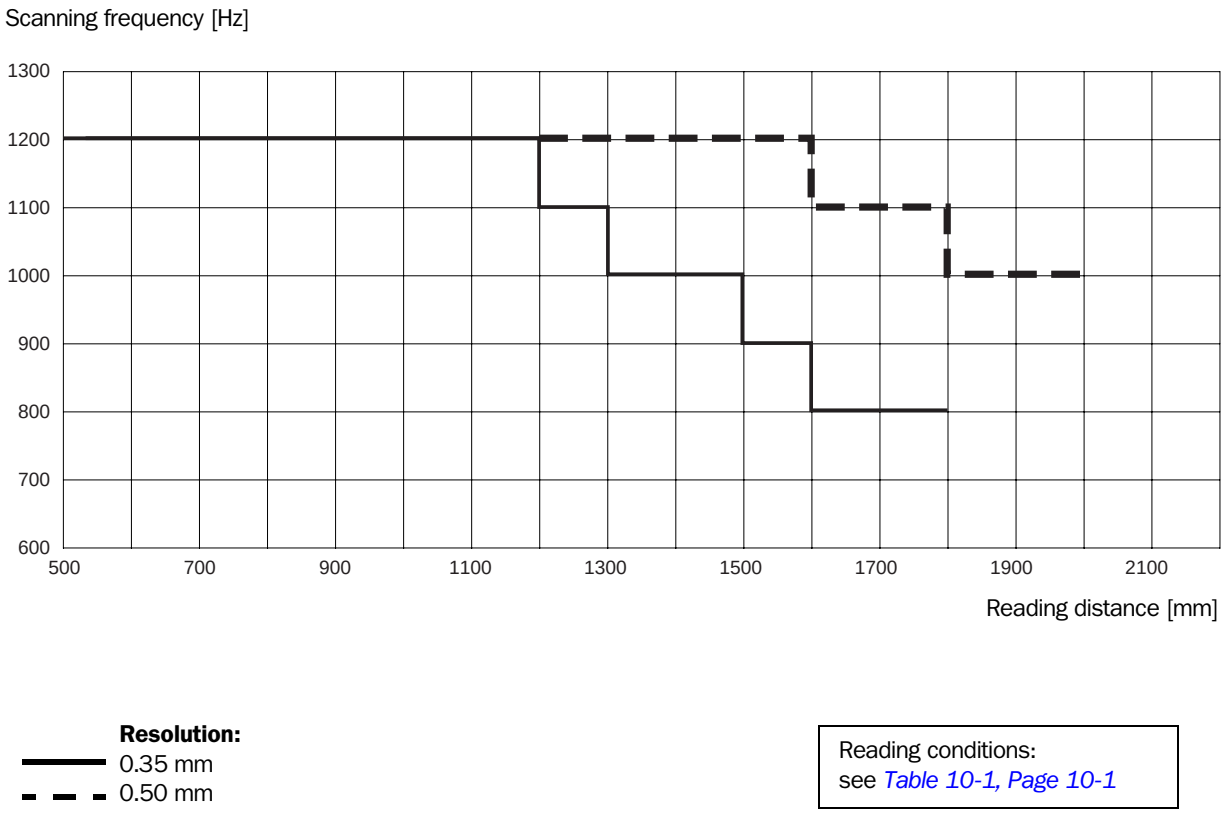

Fig. 10-12: Characteristics field CLV 490-1010/-1011: Scanning frequency as a function of the reading distance and resolution

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Line scanner with oscillating mirror (side reading window): CLV 490-1010/-1011

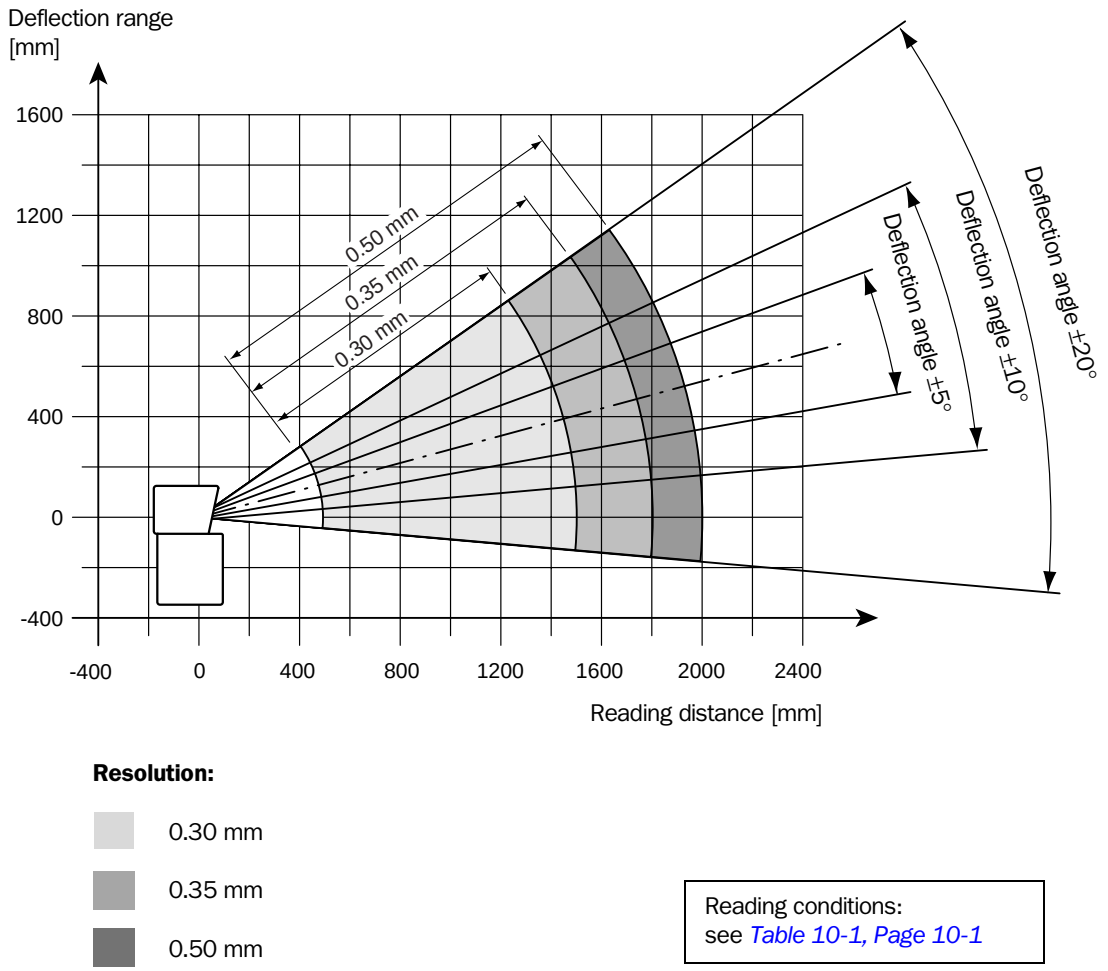

Fig. 10-13: CLV 490-1010/-1011 (Standard density): deflection range as a function of reading distance, deflection angle and resolution

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10.2.5 High density: Reading performance data of line scanner

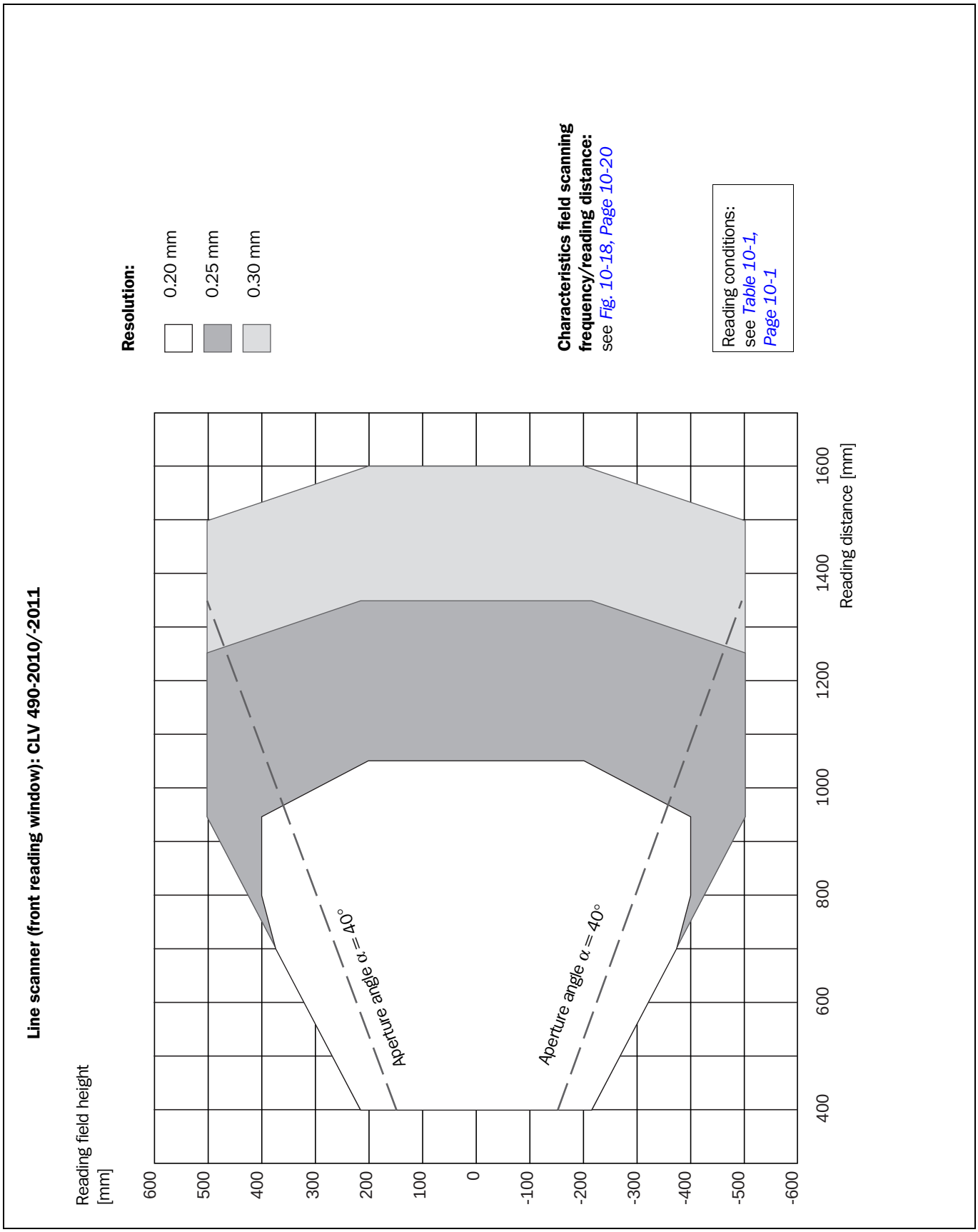

Fig. 10-14: CLV 490-2010/-2011 (High density): Reading field height as a function of the reading distance and resolution

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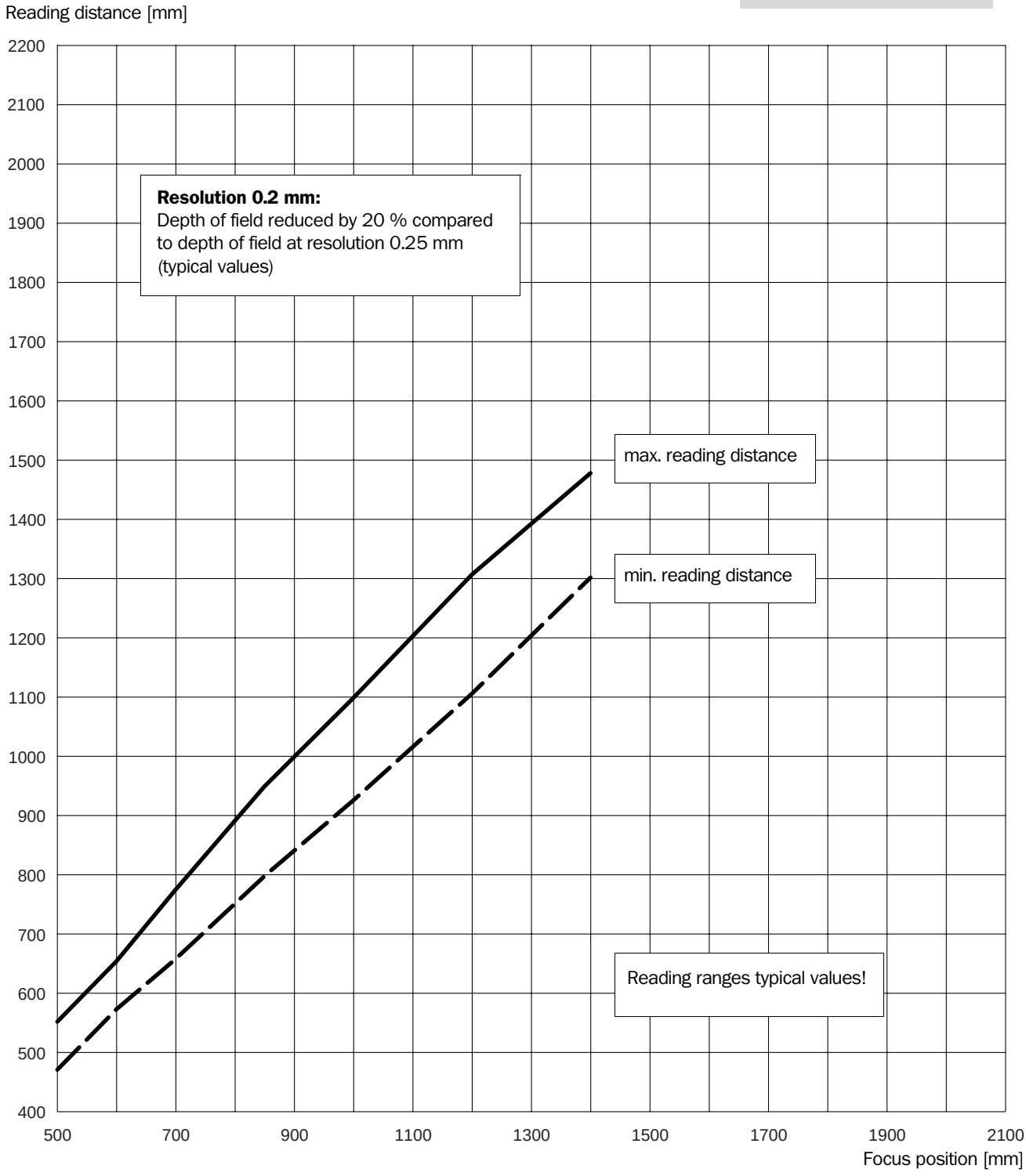
Line scanner (front reading window): **CLV 490-2010/-2011**

Resolution: **0.25 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Table 10-18, Page 10-20*

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-15: CLV 490-2010/-2011 (High density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.25 mm and an aperture angle of $\alpha = 40°$

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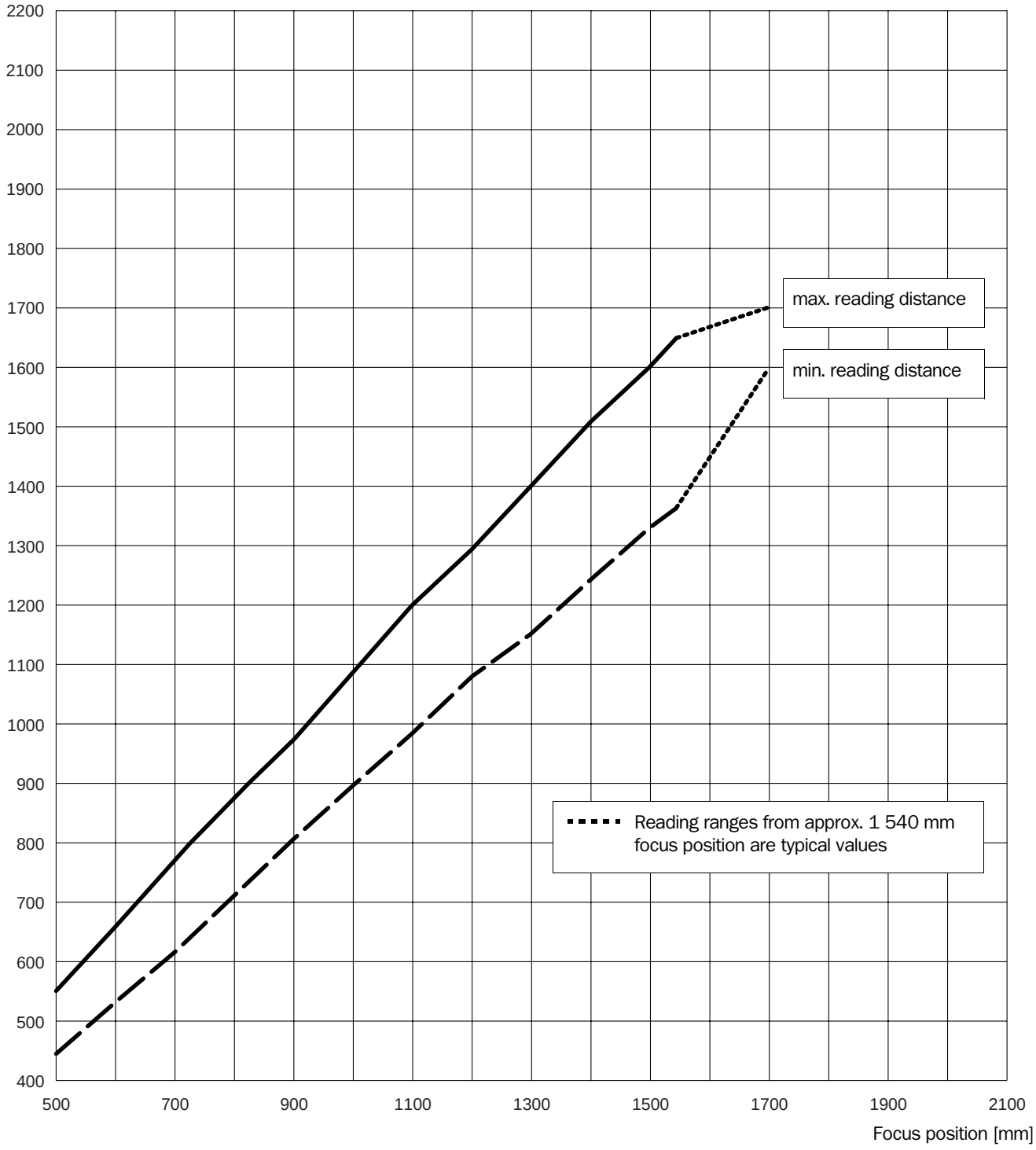
Line scanner (front reading window): **CLV 490-2010/-2011**

Resolution: **0.35 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Table 10-18, Page 10-20*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-16: CLV 490-2010/-2011 (High density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 40°$

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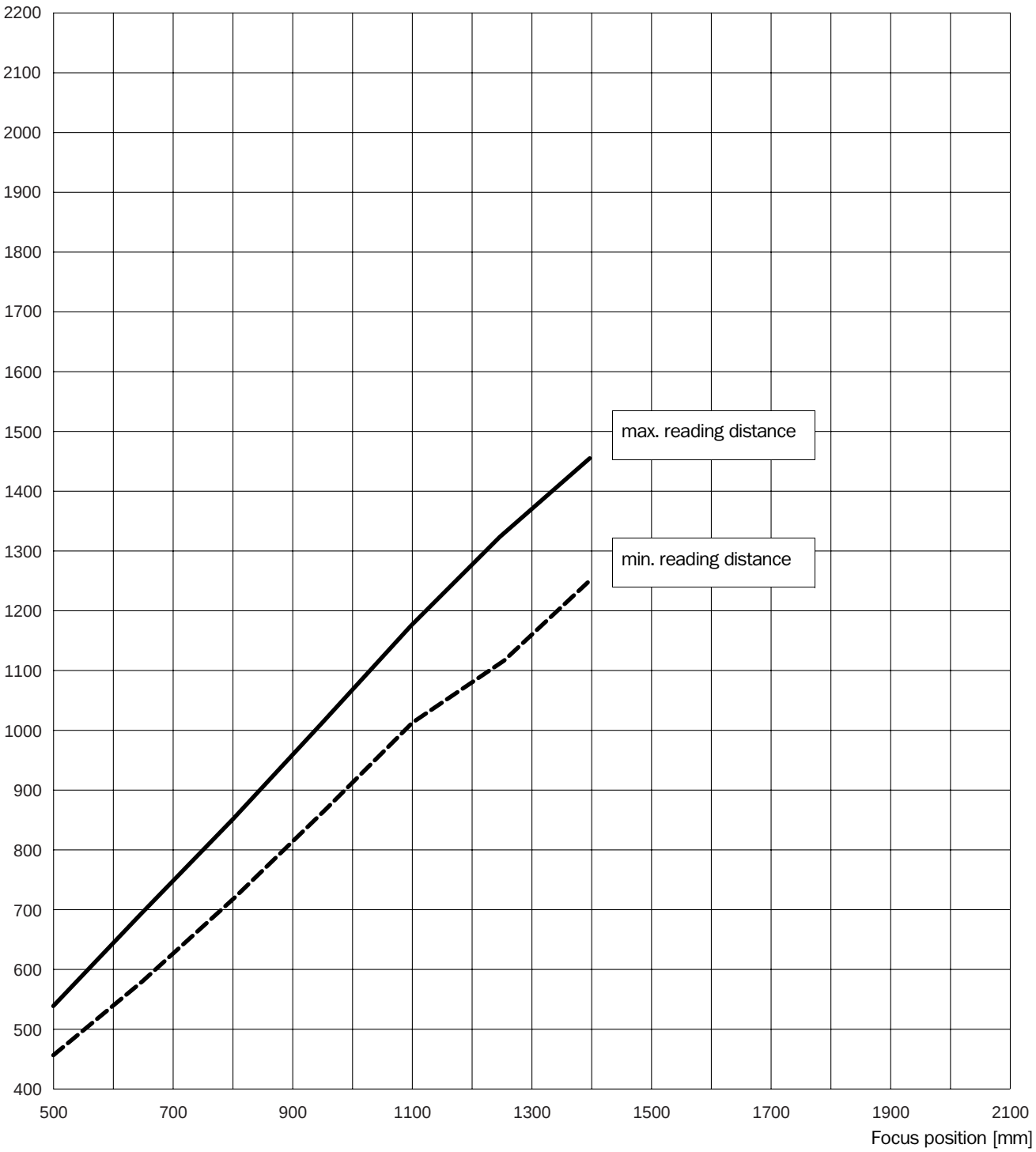
Line scanner (front reading window): **CLV 490-2010/-2011**

Resolution: **0.35 mm**
Aperture angle: **56°**



Characteristics field scanning frequency/ reading distance: see *Table 10-18, Page 10-20*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-17: CLV 490-2010/-2011 (High density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 56°$

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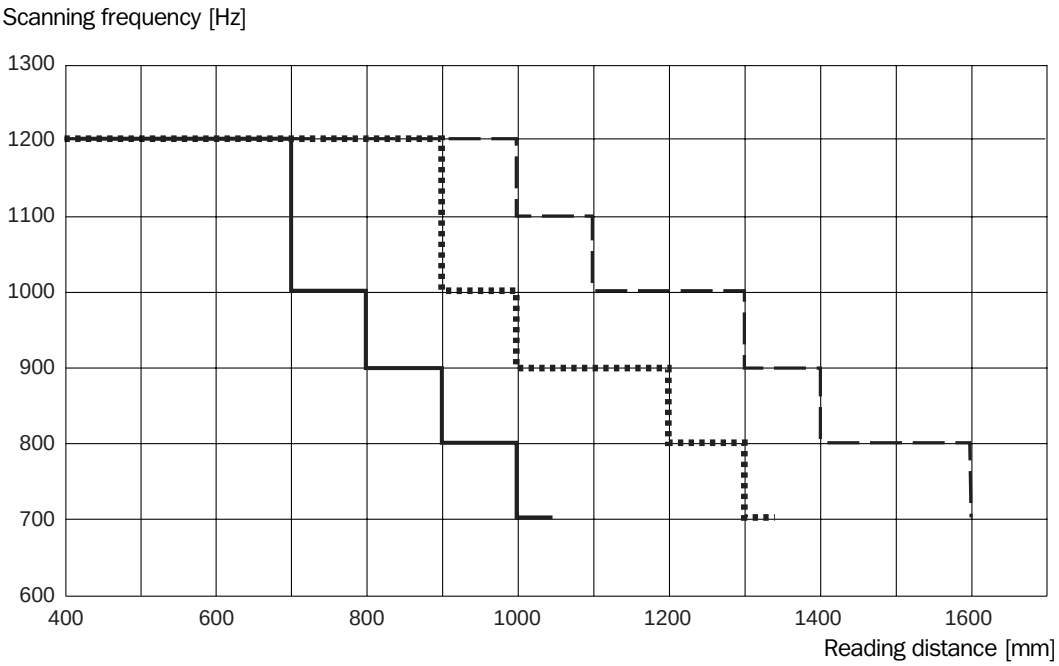
Line scanner (front reading window): **CLV 490-2010/-2011**



Resolution:
0.20 mm
0.25 mm
0.30 mm

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-18: Characteristics field CLV 490-2010/-2011: Scanning frequency as a function of the reading distance and resolution

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10.2.6 High density: Reading performance data line scanner with oscillating mirror

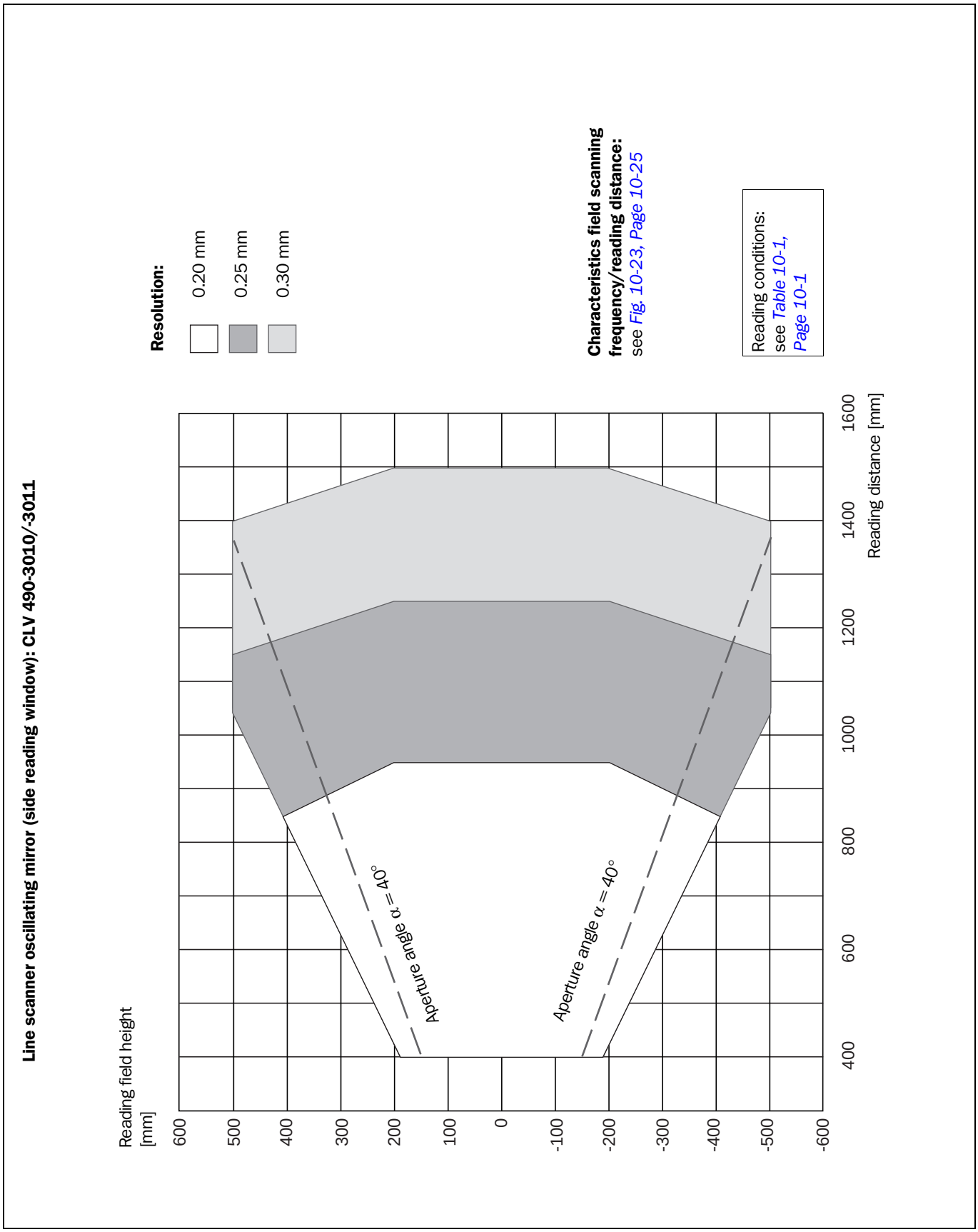

Fig. 10-19: CLV 490-3010/-3011 (High density): Reading field height as a function of the reading distance and resolution

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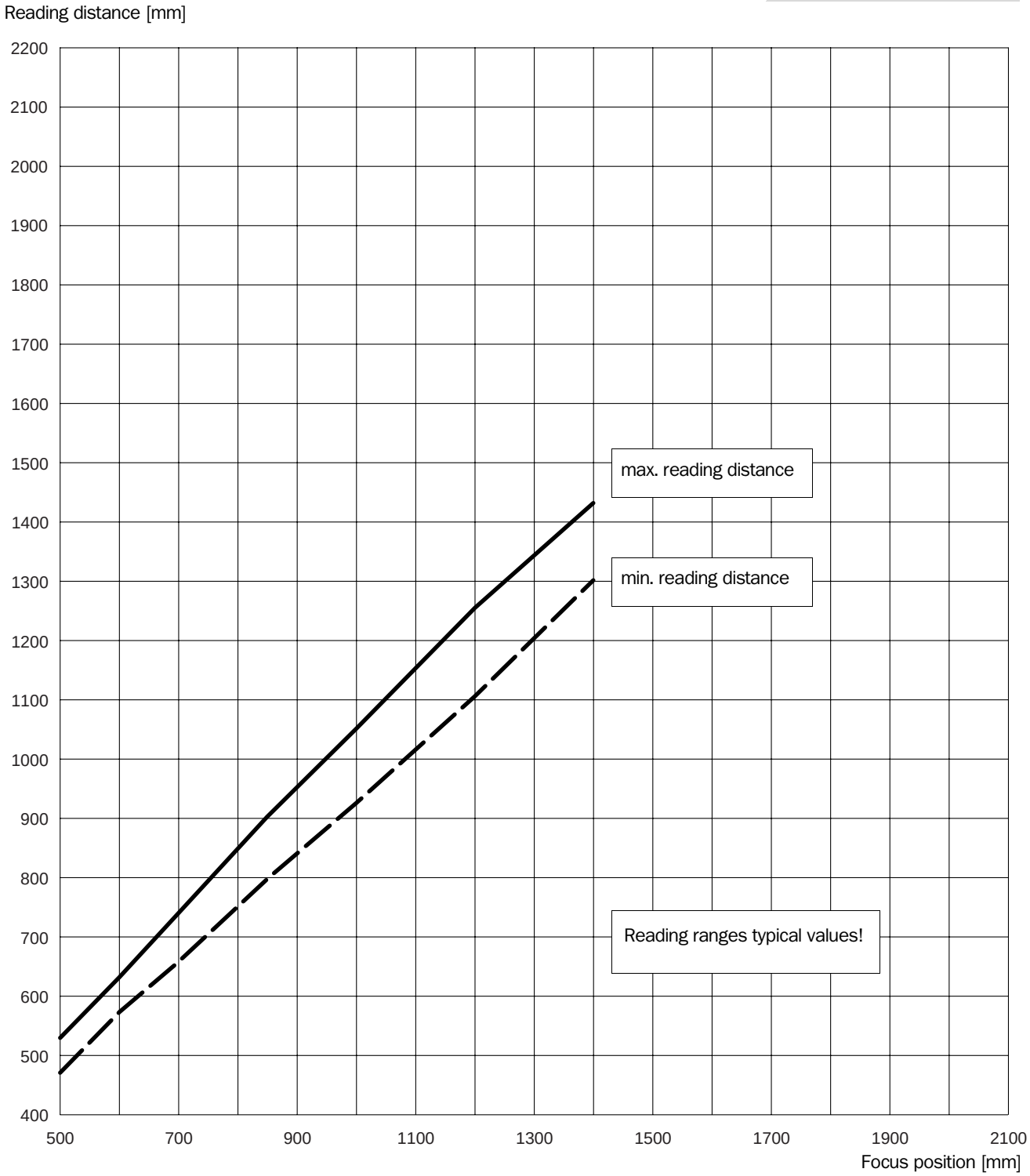
Line scanner with oscillating mirror (side reading window): CLV 490-3010/-3011

Resolution: **0.25 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Table 10-23, Page 10-25*

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-20: CLV 490-3010/-3011: (High density) Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.25 mm and an aperture angle of $\alpha = 40°$

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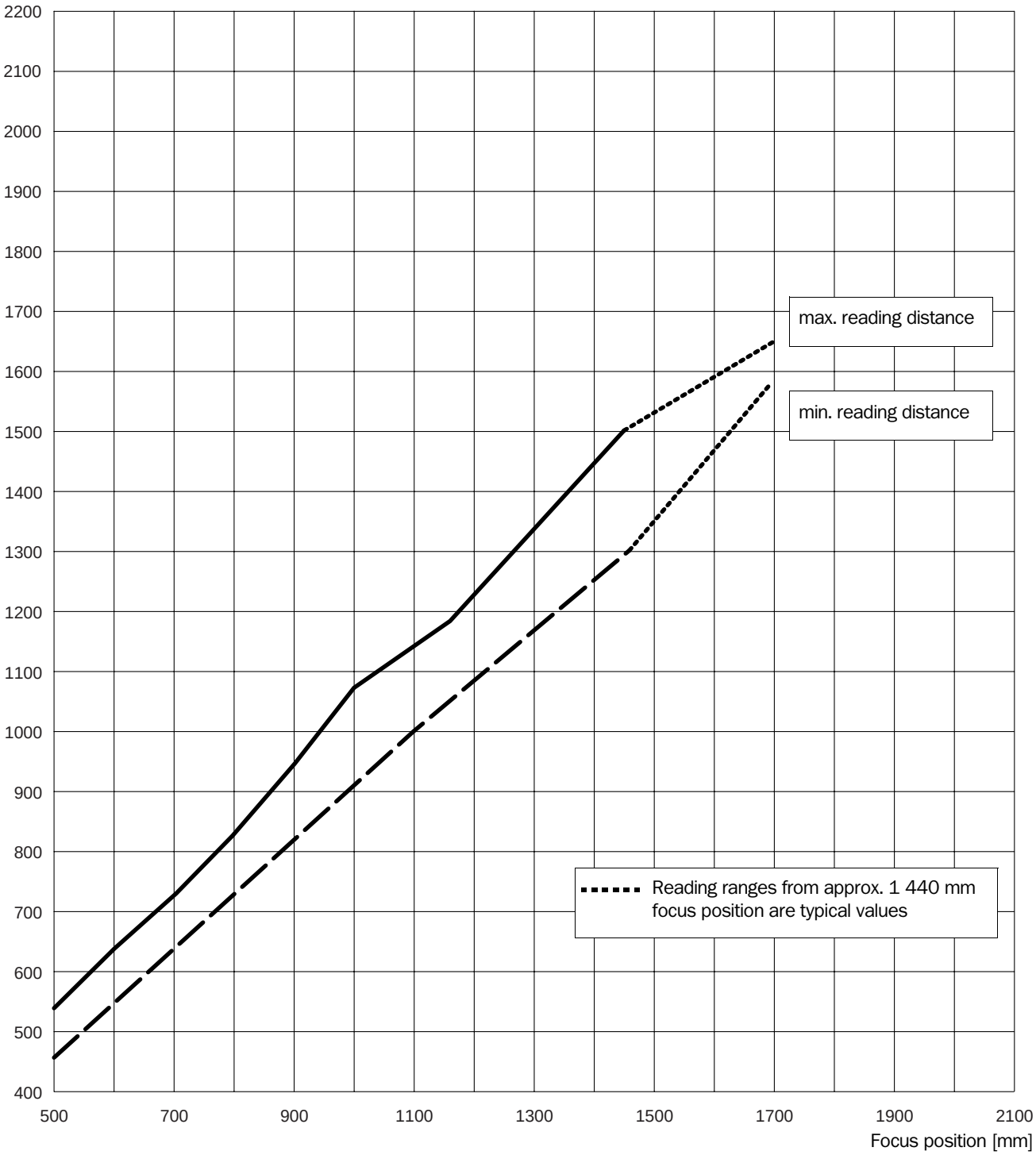
Line scanner with oscillating mirror (side reading window): CLV 490-3010/-3011

Resolution: **0.35 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Table 10-23, Page 10-25*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-21: CLV 490-3010/-3011 (High density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 40°$

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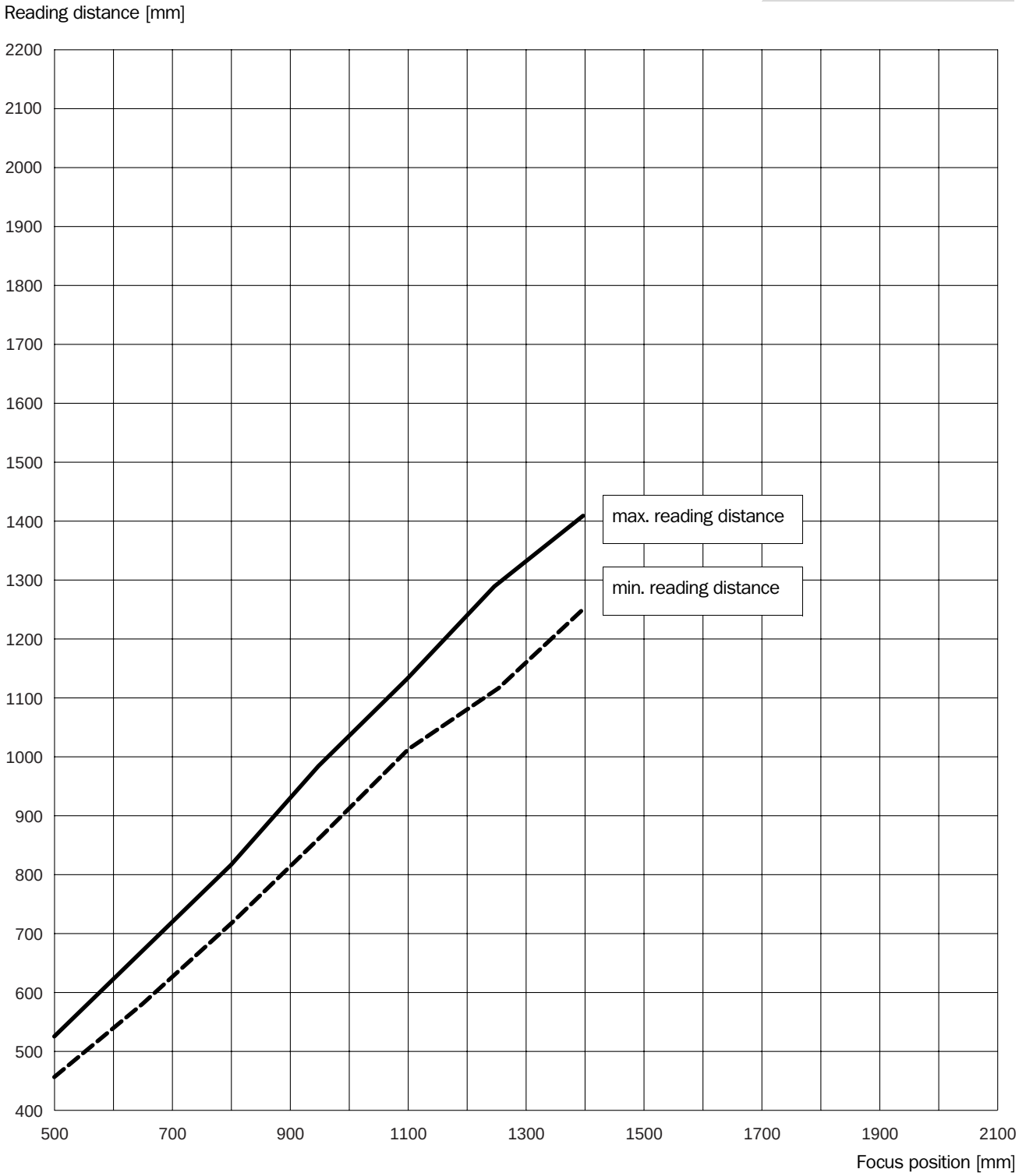
Line scanner with oscillating mirror (side reading window): CLV 490-3010/-3011

Resolution: **0.35 mm**
Aperture angle: **50°**



Characteristics field scanning frequency/ reading distance: see *Table 10-23, Page 10-25*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-22: CLV 490-3010/-3011 (High density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm and an aperture angle of $\alpha = 50°$

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Line scanner with oscillating mirror (side reading window): CLV 490-3010/-3011

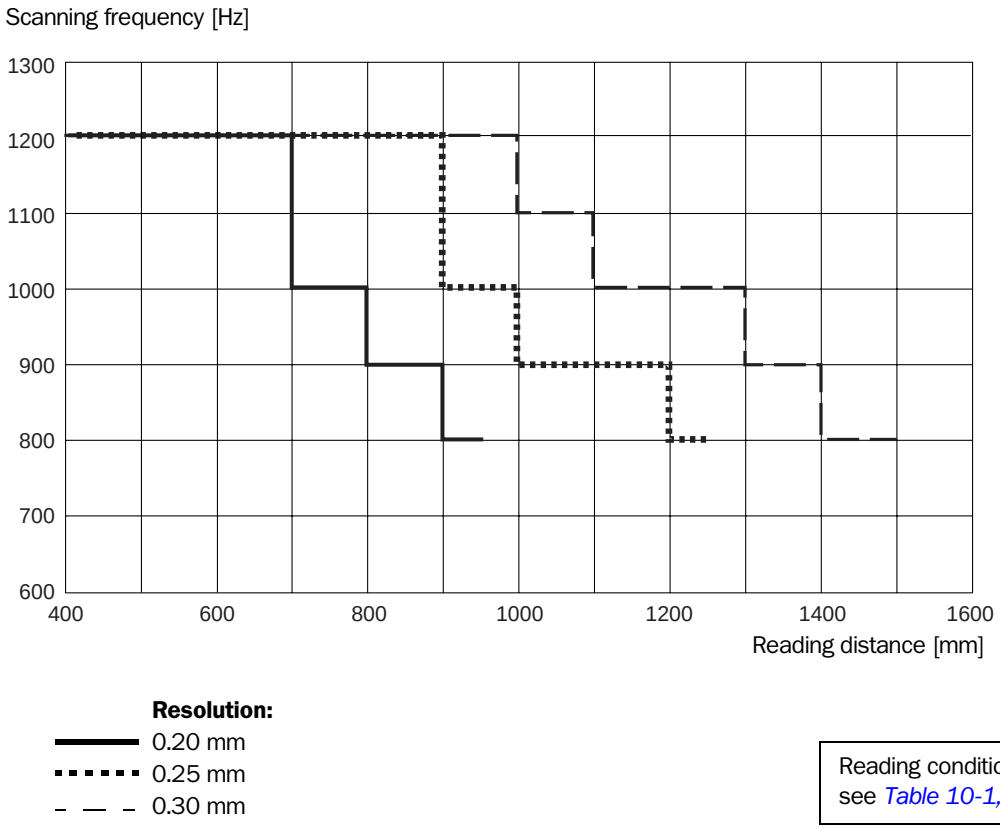

Fig. 10-23: Characteristics field CLV 490-3010/-3011: Scanning frequency as a function of the reading distance and resolution

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Line scanner with oscillating mirror (side reading window): CLV 490-3010/-3011

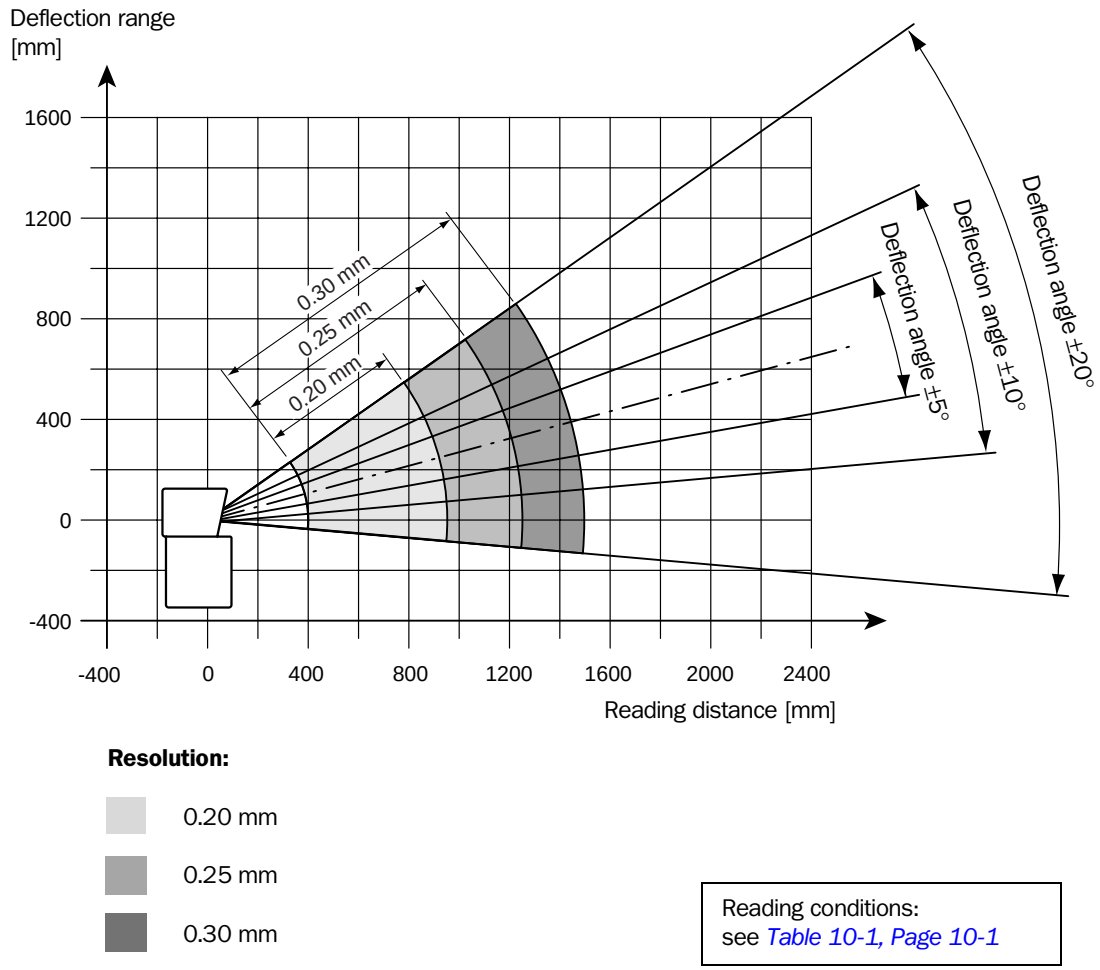

Fig. 10-24: CLV 490-3010/-3011: Deflection range as a function of reading distance, deflection angle and resolution

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10.2.7 Low density: Reading performance data of line scanner

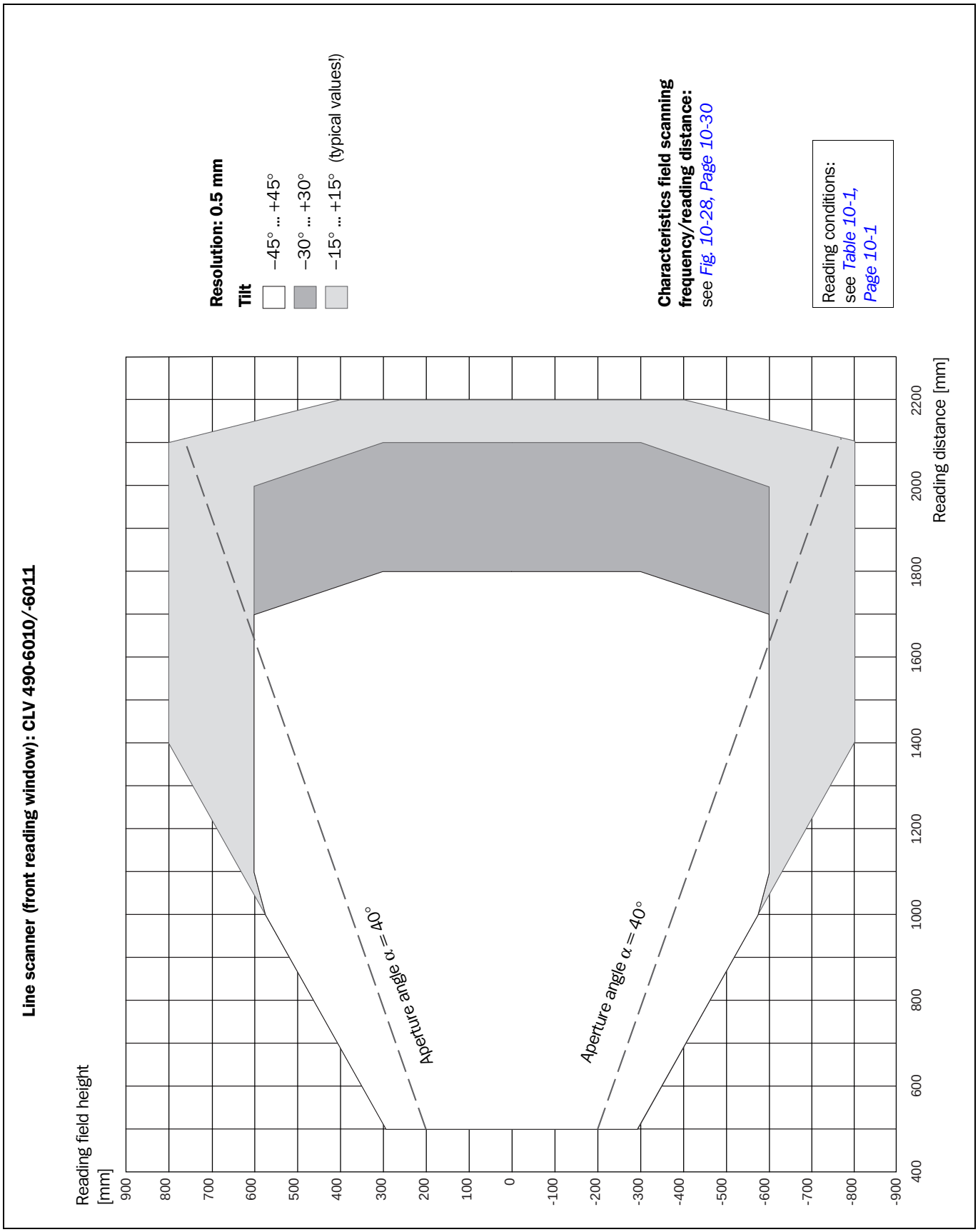

Fig. 10-25: CLV 490-6010/-6011 (Low density): Reading field height as a function of the reading distance and the tilt at a resolution of 0.5 mm

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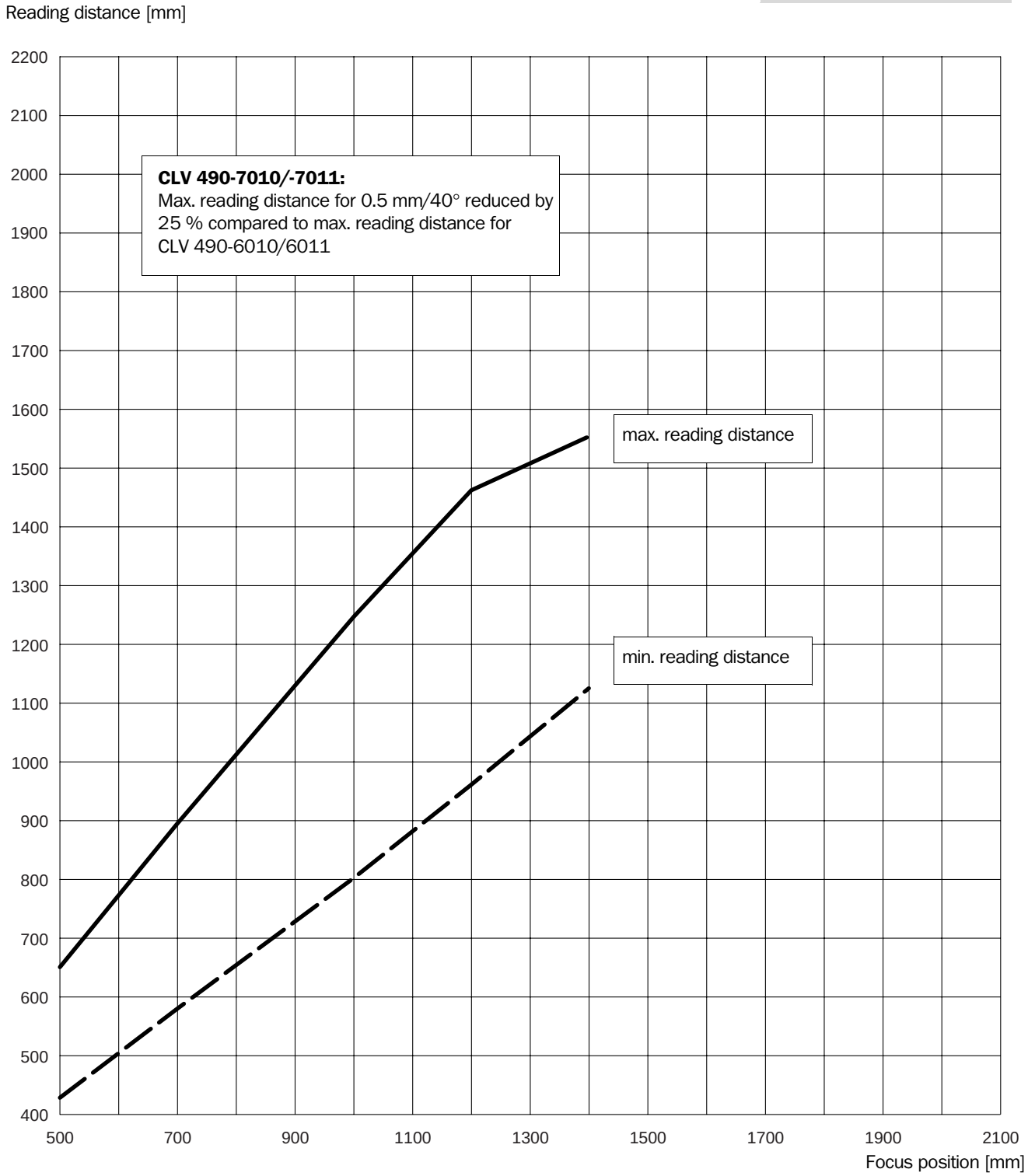
Line scanner (front reading window): **CLV 490-6010/-6011**

Resolution: **0.5 mm**
Aperture angle: **40°**



Characteristics field scanning frequency/ reading distance: see *Table 10-28, Page 10-30*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-26: CLV 490-6010/-6011 (Low density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.5 mm and an aperture angle of $\alpha = 40°$

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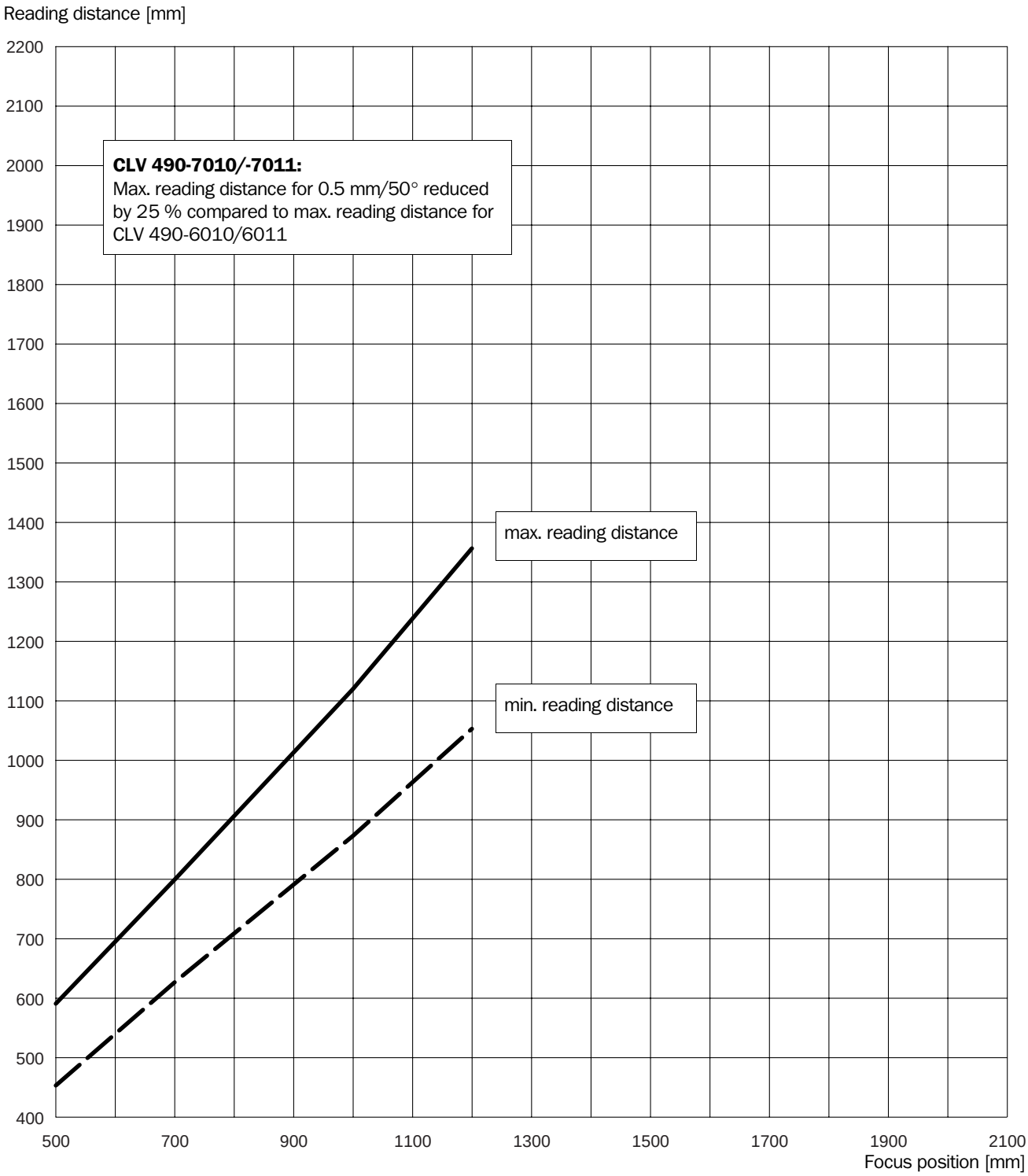
Line scanner (front reading window): **CLV 490-6010/-6011**

Resolution: **0.5 mm**
Aperture angle: **60°**



Characteristics field scanning frequency/ reading distance: see *Table 10-28, Page 10-30*

Reading conditions: see *Table 10-1, Page 10-1*

Fig. 10-27: CLV 490-6010/-6011 (Low density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.5 mm and an aperture angle of $\alpha = 60°$

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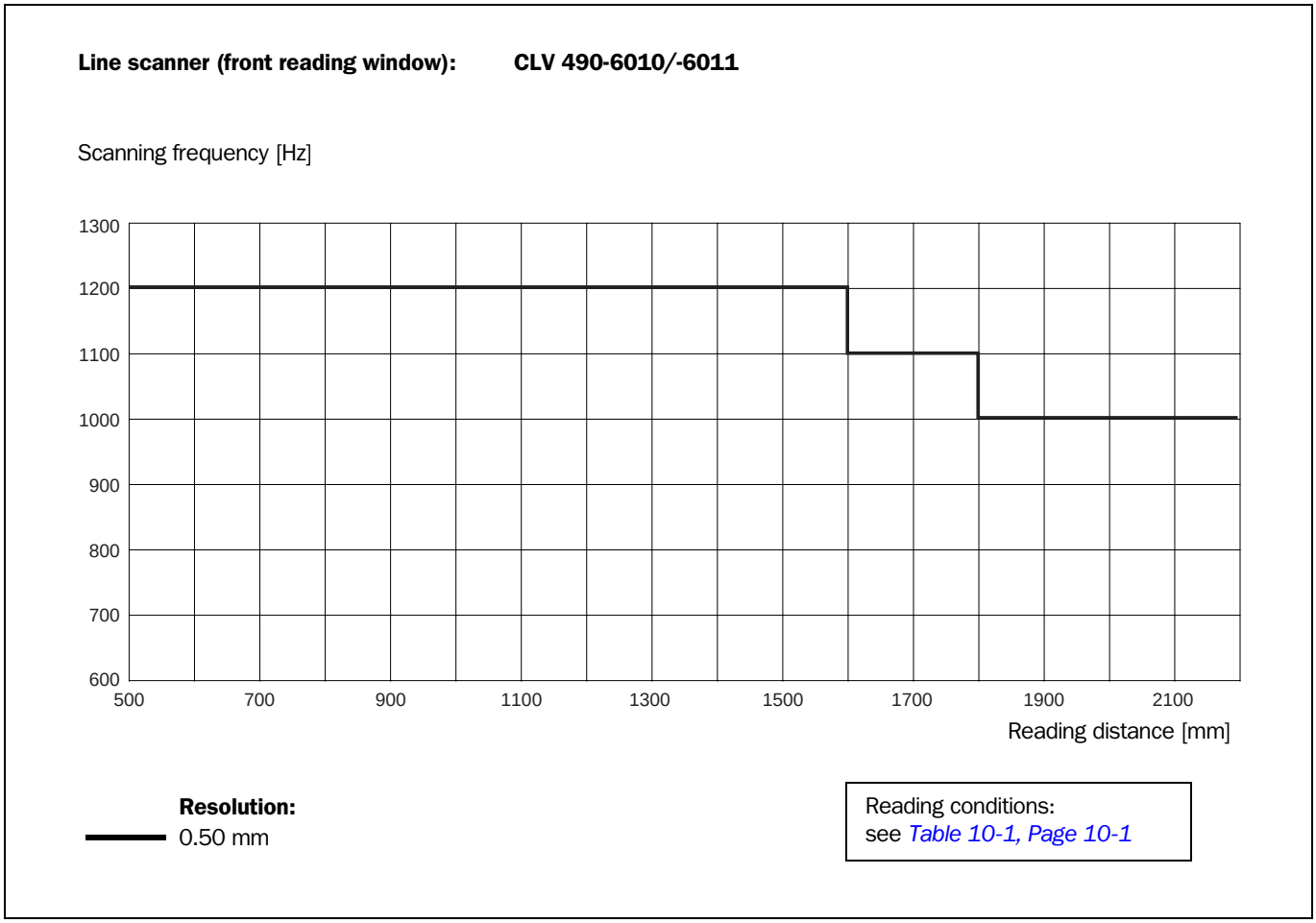

Fig. 10-28: Characteristics field CLV 490-6010/-6011: Scanning frequency as a function of the reading distance and resolution

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10.2.8 Low density: Reading performance data of line scanner with oscillating mirror

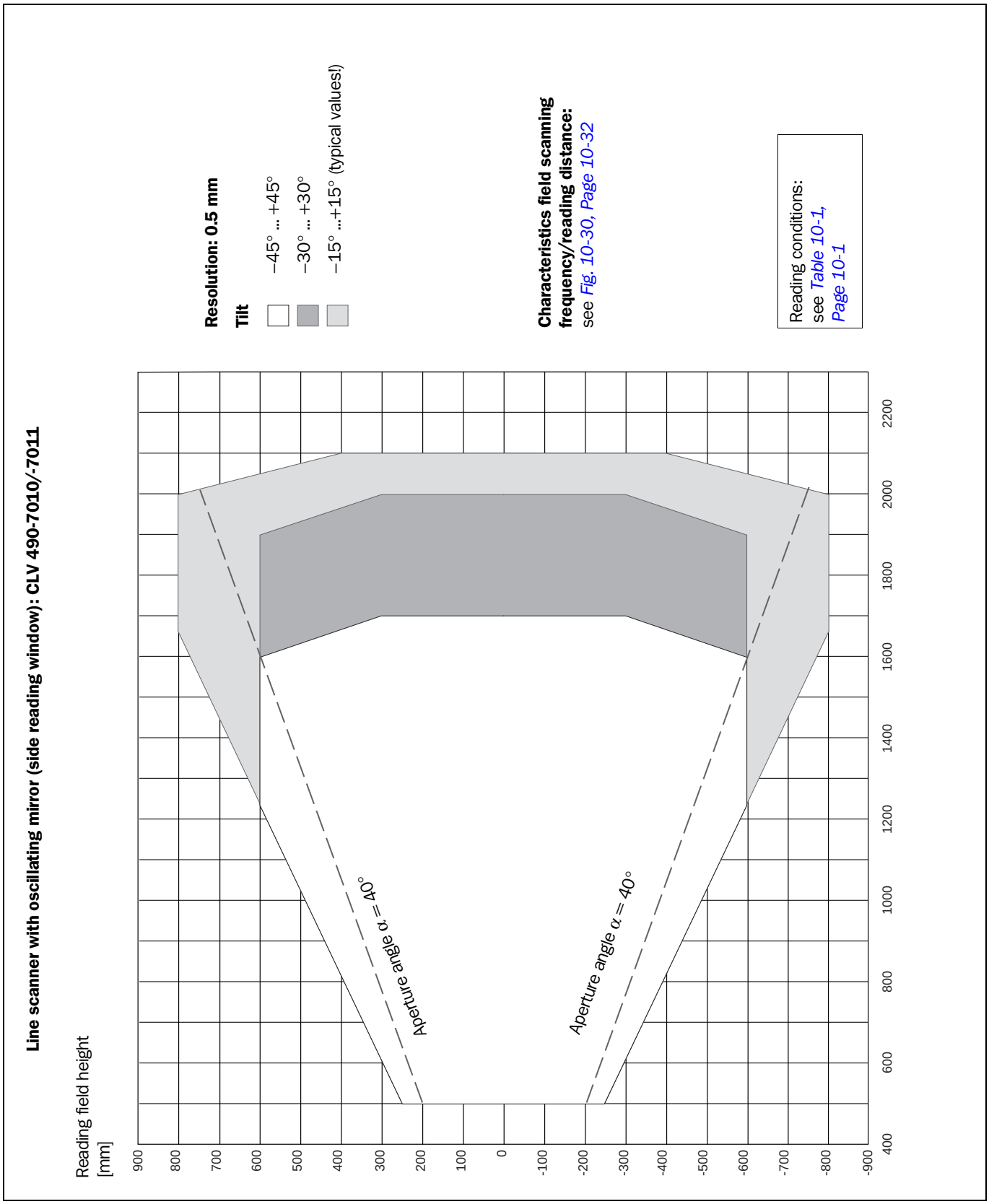
Line scanner with oscillating mirror (side reading window): CLV 490-7010/-7011
Resolution: 0.5 mm
Tilt
–45° ... +45°
–30° ... +30°
–15° ...+15° (typical values!)
Characteristics field scanning frequency/reading distance:
see Fig. 10-30, Page 10-32
Reading conditions:
see Table 10-1, Page 10-1
Reading field height [mm]
Aperture angle α = 40°
Aperture angle α = 40°
900 800 700 600 500 400 300 200 100 0 -100 -200 -300 -400 -500 -600 -700 -800 -900
400 600 800 1000 1200 1400 1600 1800 2000 2200

Fig. 10-29: CLV 490-7010/-7011 (Low density): Reading field height as a function of the reading distance and tilt at a resolution of 0.5 mm

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Reading distance at a resolution of 0.5 mm/aperature angle 40°

see *Fig. 10-26, Page 10-28*

Reading distance at a resolution of 0.5 mm/aperature angle 50°

see *Fig. 10-27, Page 10-29*

Line scanner with oscillating mirror (side reading window): CLV 490-7010/-7011

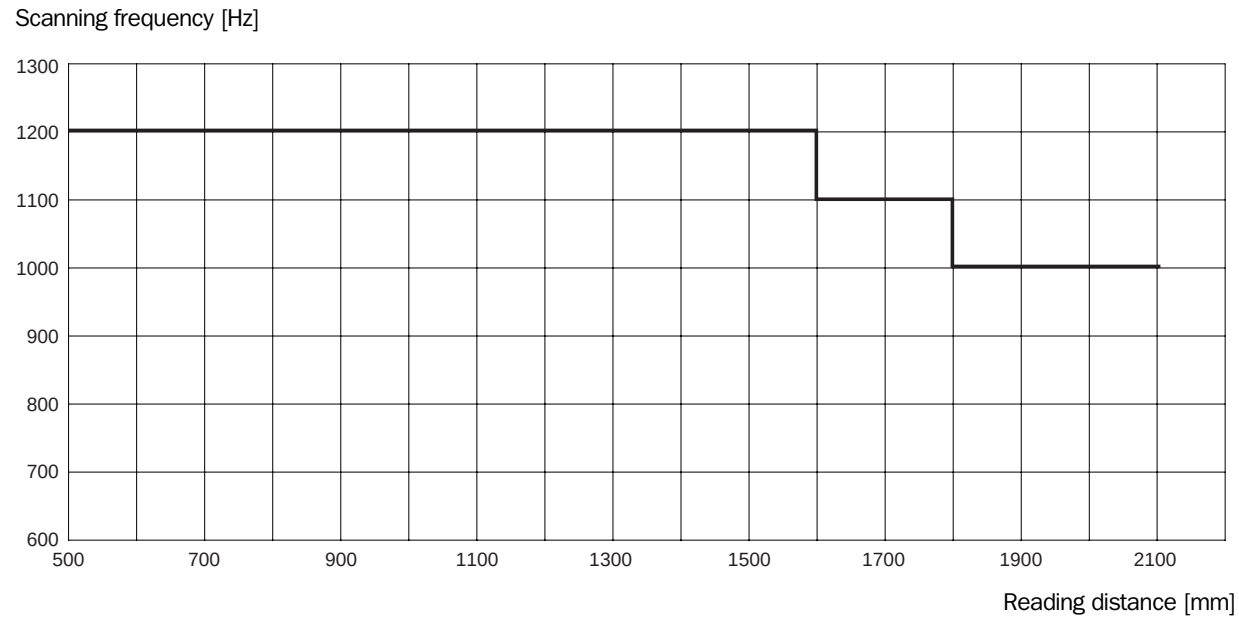

Fig. 10-30: Characteristics field CLV 490-7010/-7011: Scanning frequency as a function of the reading distance and resolution

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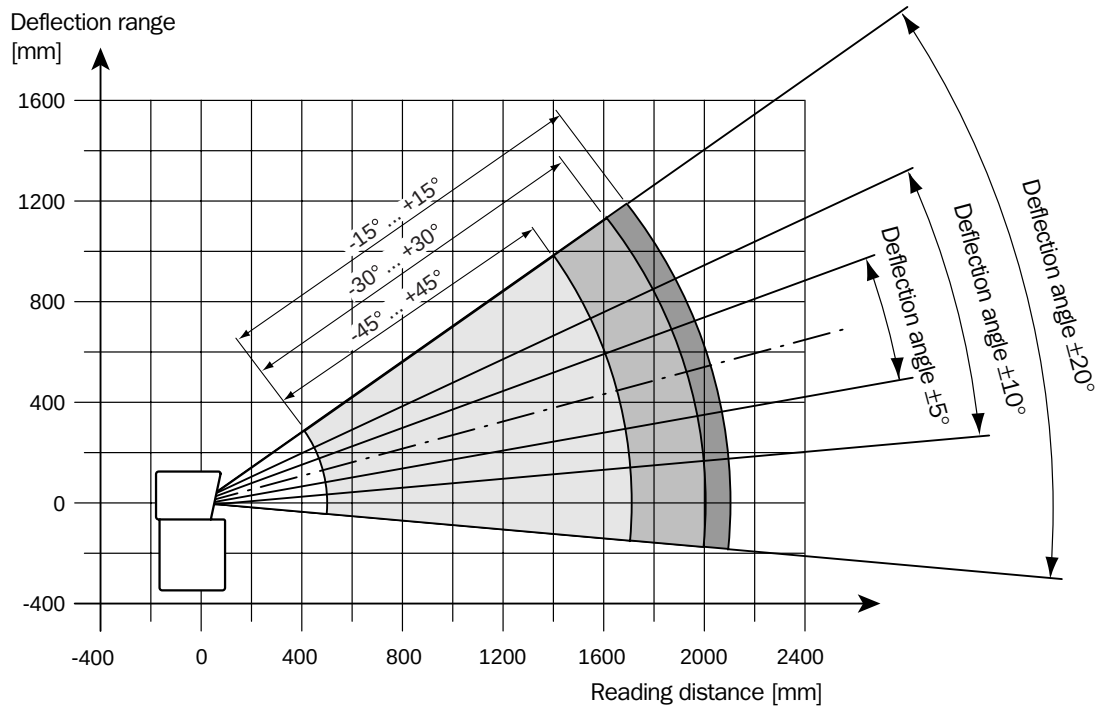
Line scanner with oscillating mirror (side reading window): CLV 490-7010/-7011



Tilt:

–45° ... +45°

–30° ... +30°

–15° ...+15°

Resolution: 0.50 mm

Reading conditions:
see *Table 10-1, Page 10-1*

Fig. 10-31: CLV 490-7010/-7011: Deflection range as a function of reading distance, deflection angle and tilt at a resolution of 0.5 mm

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10.3 Installing and operating the external parameter memory

The external parameter memory is available as an accessory. It is located in a connector cover and comprises a permanent, rewriteable memory (EEPROM). The connector cover covers the two connections of the CLV in the enclosure rating IP 65. The cover is shown in *Fig. 10-32*. Two connection cables that are secured by means of conduit thread connections supply the signals to the CLV.

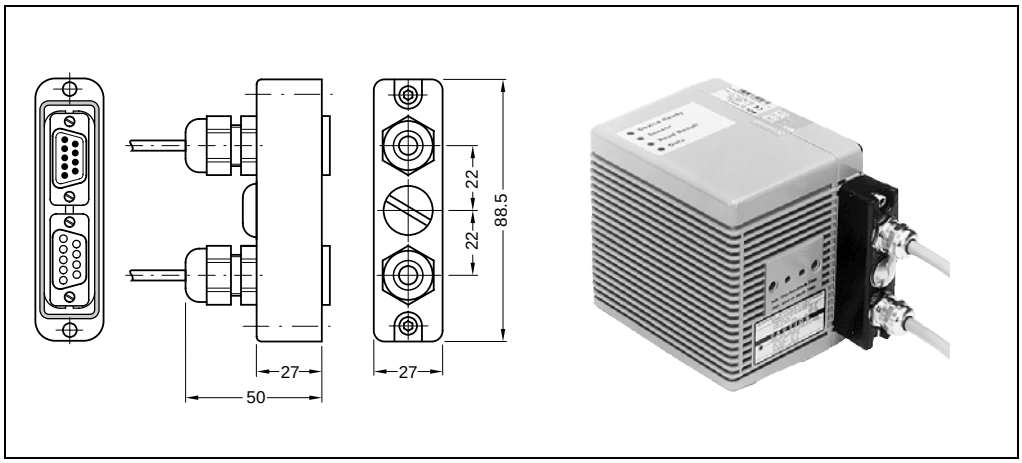

Fig. 10-32: External parameter memory, installed on the CLV

The external parameter memory is available in different implementations:

Order no.	Two Connection cables with	CLV	Length	Connection
2 020 307	Two 15-pin D Sub HD plug connections (pin assignment identical to device connections)	**Without** heater	3 m	CLV to AMV/S 60 AMV 30-071 and BMV 10
2 020 981	Two open cable ends	**Without** heater	3 m	CLV to non-Sick Power pack, free wiring
2 020 308	One 9-pin D Sub cable connector and one open cable end	**Without** heater	3 m	CLV to BMS 20
2 021 689	Two 15-pin D Sub HD plug connections, (pin assignment identical to device connections)	**With** heater	3 m	CLV to AMV 100/200

Table 10-4: External parameter memory

10.3.1 Function

When it is started, the CLV is initialized with the data stored in its internal parameter set. If this parameter set has been copied to an external memory, the device can be replaced easily. The replacement device, therefore, does not have to be configured manually. Instead, it accesses the external parameter memory automatically (assuming that the correct start option has been selected). It then imports the parameter set to its RAM. This option is set by default. The "Device Ready" and "Read Result" LEDs indicate whether the external memory was accessed successfully. The CLV also outputs plain-text messages for troubleshooting purposes on the terminal interface.

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10.3.2 Installation and electrical connection

The pin assignments for the connection cables of the parameter memory no. 2 020 307/ no. 2 021 689 are shown in *Table 5-5* and *Table 5-6, Page 5-7*.

➢ Mount the parameter memory on the CLV as shown in *Chapter 5.5.3 Connecting the supply voltage, Page 5-13* and connect the cables to the AMV/S 60 Connection Module.

The color assignment of the wiring for the open ends of the connection cables for the parameter memory no. 2 020 981 is shown in *Table 5-12 and Table 5-13, Page 5-11*.

➢ Mount the parameter memory on the CLV as shown in *Chapter 5.5.3 Connecting the supply voltage, Page 5-13* and connect the cables to the external power supply.

10.3.3 Operation

The parameter memory connected to the CLV is accessed

- using the selected CLV start option
- after the parameters have been downloaded to the CLV with the permanent storage function and the START WITH EXTERNAL PARAMETERS option

The start option is set at the bottom right of the DEVICE CONFIGURATION tab as shown in *Fig. 10-33* (white frame). The START WITH EXTERNAL PARAMETERS option is selected by default.

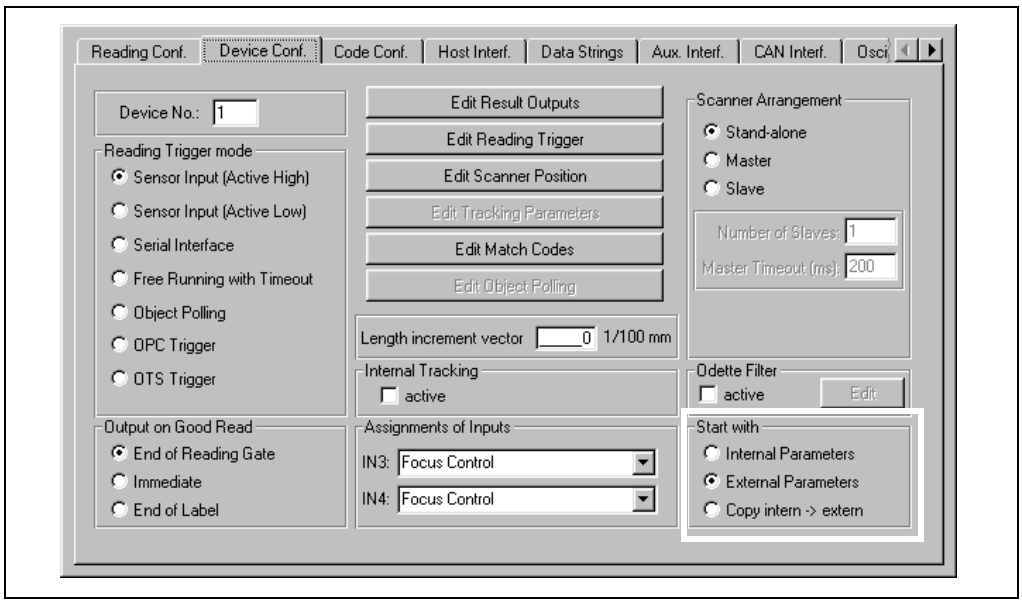

Fig. 10-33: CLV-Setup: "Device configuration" tab with the CLV start options

Start with internal parameters

When it starts, the CLV loads the internal parameter set to its RAM.
The "Device Ready" LED lights up constantly.
Since the data is stored permanently, it is not lost when the device is switched off.

Start with external parameters (default setting)

When it starts, the CLV loads the external parameter set to its RAM.
The "Device Ready" LED blinks for approx. 10 s and then lights up constantly.
The data in the CLV is lost when the device is switched off.

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Start with copy internal -> external

When it starts, the CLV loads the internal parameter set to its RAM. It then copies the parameter set to the external memory and resets the start option to START WITH EXTERNAL PARAMETERS.

The two "Device Ready" and "Read Result" LEDs blink alternately for approx. 10 s. The "Device Ready" LED then lights up constantly.

The data is not lost when the device is switched off since it is stored permanently in the CLV and is identical to the internal parameter set.

10.3.4 Switching on the device for the first time

Since the external parameter memory is empty on delivery, the "Device Ready" and "Read Result" LEDs blink constantly when the device is switched on for the first time with the default setting (START WITH EXTERNAL PARAMETER). The CLV has not found an external parameter set and has loaded the internal parameter set. However, it is not ready for operation and does not output data on the host interface.

➢ Transfer the CLV parameter set to the parameter memory for the first time as described in *Chapter 6.3.2 Switching the CLV with external parameter memory connected on for the first time with the factory default settings, Page 6-4*.

10.3.5 Adjusting the parameter set in the external parameter memory after it has been downloaded to the CLV

If the CLV is started with the START WITH EXTERNAL PARAMETERS option with an external parameter memory and if the parameter set is downloaded from CLV-Setup to the CLV with the **permanent** storage option, CLV-Setup asks you whether the new parameter set is also to be copied to the external parameter memory (*Fig. 10-34*). This function prevents the CLV from reloading the old parameter set the next time it starts.

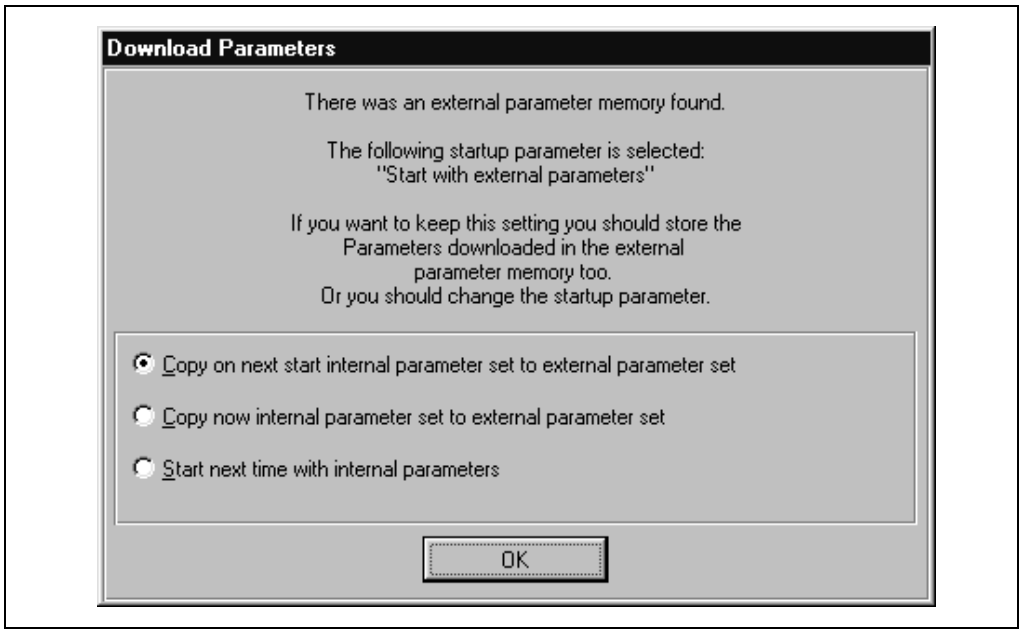
Download Parameters
There was an external parameter memory found.
The following startup parameter is selected:
"Start with external parameters"
If you want to keep this setting you should store the
Parameters downloaded in the external
parameter memory too.
Or you should change the startup parameter.
Copy on next start internal parameter set to external parameter set
Copy now internal parameter set to external parameter set
Start next time with internal parameters
OK

Fig. 10-34: CLV-Setup: dialog box for adjusting the external parameter memory

➢ Adjust the parameter set in the external parameter memory as described in *Chapter 6.4.1 Configuring the CLV via the user interface of CLV-Setup, Page 6-5*

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10.3.6 Meaning of the LEDs

The function of the two "Device Ready" and "Read Result" LEDs, as defined by the selected start option, is shown in *Table 3-3, Page 3-10*. Their function in the event of an error accessing the external memory as well as troubleshooting measures are described in *Table 8-2, Page 8-5*.

10.3.7 Error messages

If errors occur accessing the external parameter memory, the CLV outputs error messages on the terminal interface. When the CLV is **started**, these messages can be displayed using the "CLV-Setup" program.

1. Connect the PC to the terminal interface on the CLV using an RS 232 cable (AMV/S 60: connect the PC to the internal 9-pin Service plug). *See Chapter 5.5.5 Connecting the CAN interface, Page 5-15*.
2. Switch on the PC and start Windows.
3. Start the "CLV-Setup" program and open the Terminal Emulator.
4. Choose the extended display mode.
5. Switch on the power supply for the AMV/S 60.
   The CLV starts and loads the parameter set from the external memory.
6. Monitor the messages in the main window of the Terminal Emulator.

Table 8-3, Page 8-7 lists the error messages in alphabetical order with the appropriate troubleshooting measures.

10.3.8 Replacing a CLV

The device is replaced by starting the new CLV with the START WITH EXTERNAL PARAMETERS option (default). This is the case when the device is put into service for the first time, e. g. when it is taken from the warehouse. The device must be replaced with a device of the same type. You do not need to connect a PC to replace the device.

➢ Replace the device as described in *Chapter 10.12.2 Importing the parameter set from the external memory, Page 10-70*.

The CLV imports the external parameter set into the RAM. This is sufficient to ensure that the device operates correctly. If the parameter set is to be stored permanently in the CLV (EEPROM), a PC with the "CLV-Setup" program must be connected to upload the parameter set from the CLV to CLV-Setup and then download it again to the CLV with the PERMANENT storage option. When asked to do so, adjust the external memory again.

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10.4 Optional heating

10.4.1 Features

- Integrated heater (permanently installed)
- Wider range of applications for CLV: up to max. –35 °C
- Supply voltage 24 V DC +20 %/–10 %
- CLV enabled via internal temperature switch (power-up delay approx. 35 ... 40 min. at 24 V DC and min. ambient temperature of –35 °C)
- Required cable cross-section (power supply): min. 0.75 mm^2

10.4.2 Design

The heating system comprises two parts:

- the front window heater
- the housing heater

The optional heating system is installed and tested at the factory. The user cannot install it on site.

10.4.3 Function

When the 24 V DC supply voltage is applied, a temperature switch first supplies electric current to the heater only. This switch enables the supply voltage for the CLV when the internal temperature rises above 7 °C during the warm-up phase (approx. 35 min). The device then performs a self-test and switches to Reading mode. The "Device Ready" LED lights up to indicate that the device is ready.

When the internal temperature has reached approx. 25 °C, a further temperature switch deactivates the housing heater and reactivates it if necessary. Reading mode is not interrupted as a result. The front window heater remains active constantly. The temperature curve inside the housing is shown in *Fig. 10-35*.

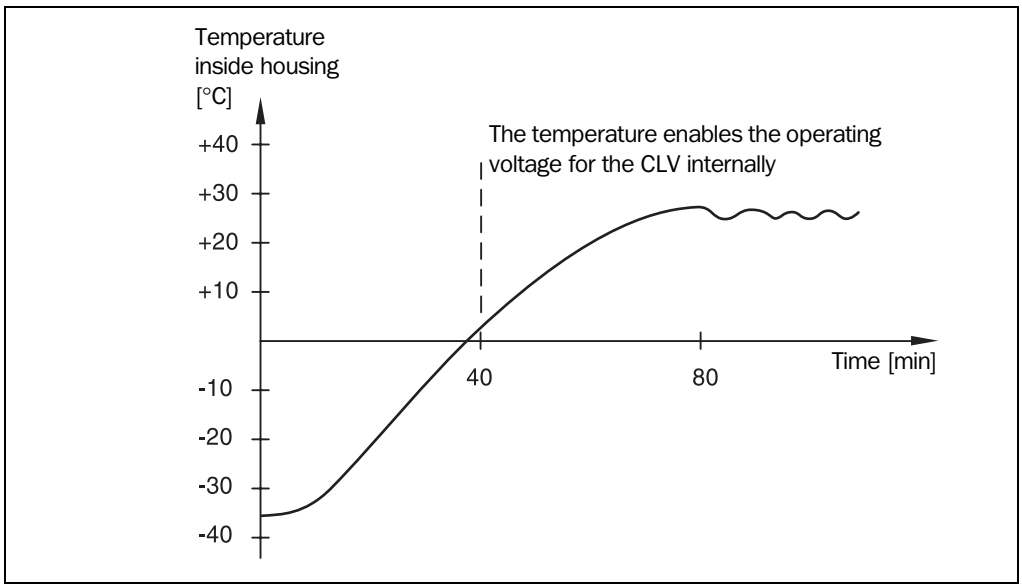

Fig. 10-35: CLV with heater: temperature curve inside the housing

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10.4.4 Electrical installation

Cable cross-section

The connection cables for the power supply must have a cross-section of at least 0.75 mm^2.
See also *Chapter 5.4.2 Supply voltage, Page 5-8*.

Power consumption

The power consumption depends on the variant:

- Line scanner with heater: typically 75 W and max. 90 W
- Line scanner with oscillating mirror and heater: typically 75 W and max. 100 W

These values apply to operation without the switching outputs connected.

AMV/S 60 Connection Module

The AMV/S 60 Connection Module is not suitable to power the CLV with heater. An external power supply pack with a higher power output should be used for this purpose.

See *Chapter 3.1.3 System requirements, Page 3-2*.

10.4.5 Outdoor applications

If the CLV with integrated heater is used outdoors, it should be installed in a protective housing to prevent the front window from being damaged by rain, snow, or dust. The housing also acts as a wind protector.

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10.5 System messages

The CLV outputs all system messages in plain text on the terminal interface. The messages are in English and can be displayed in the extended Terminal Emulator mode in the "CLV-Setup" program.

See also *Chapter 6.6.1 Displaying messages, Page 6-33*.

10.5.1 CLV without external parameter memory

Message	Meaning
"CLV 490 Soft.Vers. Vx.xx Aend. Nr. 0000 CLV 490/OTS"	The software version and revision is displayed when the power supply is switched on.
"internal parameters loaded"	When the CLV is started, it imports the parameter set that was last stored permanently in the internal EEPROM to the RAM
"laser safety timeout"	The CLV has shut off the laser diode 10 minutes (default setting) after a reading pulse has begun. The reading interval is still active, even though the CLV is no longer reading. The reading interval has to be terminated by a corresponding pulse signal. The laser diode is activated again with the next reading pulse.
"no code"	In Reading/Percentage Evaluation mode, the CLV indicates that no codes matching the parameterized evaluation conditions were detected during the reading interval (error status ST = 2 output on the host interface).
"No ext. parameter memory connected"	No external parameter memory was connected to the CLV when it was started.

Table 10-5: CLV system messages

10.5.2 CLV with external parameter memory connected

In addition to the messages above, the CLV also indicates whether it was able to access the external parameter memory

Message	Meaning
"diff. SW version of parameters"	When the CLV was started, the software version of the parameter set in the external memory was different from that in the CLV. The parameter set is still transferred.
"external parameters loaded"	When the CLV was started, the external parameter set was imported successfully to the RAM.
"internal parameters copied to external memory"	When the CLV was started, the internal parameter set was successfully copied to the external parameter memory.

Table 10-6: Additional CLV system messages for the connected parameter memory

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10.6 Installing and operating the "CLV-Setup" program

The scope of delivery of the CLV includes a CD-ROM containing the "CLV-Setup" program. The software can be installed on a PC with the following minimum configuration: 80486 processor, 66 MHz, and 16 MB RAM, CD drive, serial interface and mouse (recommended) as well as an operating system Windows 95™ /98™, Windows NT™ or Windows NT™. Approximately 26 MB of hard disk space is required to install CLV-Setup, CLV Assistant, CLV-Setup Help, and I-ViewPro™ offline browser.

10.6.1 Preparations

1. Make sure you have the CD-ROM at hand.
2. Connect the CLV to the AMV/S 60 Connection Module (see *Chapter 5.5.3 Connecting the supply voltage, Page 5-13*).
3. Connect the PC to the terminal interface on the CLV using an RS 232 cable (AMV/S 60: connect the PC to the internal 9-pin "Service" plug).
   See Chapter 5.5.5 Connecting the CAN interface, Page 5-15.
4. Switch on the power supply to the AMV/S 60.
   Once the CLV has started, the "Device Ready" LED lights up.
5. Switch on the PC and start Windows.

10.6.2 Installing the software

The "CLV-Setup" installation program creates a directory "CLV", a series of subdirectories, and the necessary links. A deinstaller is also installed automatically so that you can remove the program from the PC at any time. As of version V 2.6, CLV-Setup will only be available and further developed as a 32-bit application.

Initial installation

1. Close all Windows applications.
2. Insert CD-ROM in CD-drive.
3. Choose RUN in Windows.
   In the OPEN drop-down list, enter: "X:\setup.exe" (X = destination of drive).
   Confirm the dialog box with OK.
   – or –
   Open Windows Explorer, open the CD-ROM drive and double click on the "setup.exe" file.
   The installation program is started and guides you step by step through the installation procedure. The program asks you for your user name and company name. This information appears as a header in printouts. The "CLV-Setup" software, CLV Assistant and the CLV-Setup Help online help are installed according to the selected configuration.
4. Install the I-ViewPro™ HTML browser if necessary (the system asks you whether you want to do so). If you choose not to install I-ViewPro™ , the system searches your hard disk for the Netscape Navigator™ and uses it to display the CLV-Setup Help.
5. Read the Readme file that contains the latest information and problems regarding CLV-Setup.
6. Then confirm the installation message by clicking OK.
7. Restart the PC.
   The Windows DLL files are possibly updated.

The "CLV-Setup" program and CLV-Setup Help are installed and ready.

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The program logs all of the files that are installed to the "install.log file". This list is used by the deinstaller to remove the program and must not be deleted if you want to use the deinstaller at some time in the future.

Updating the program

There are two ways of installing a new version of CLV-Setup:

- You can install the new version and still keep the old version (parallel installation)
  – or –
- You can install the new version over the old version (overwrite)

Installing the new version while still keeping the old one

If you want to install the new version and still keep the old version of CLV-Setup, follow the procedure described under *Initial installation.* When the program asks you for the target directory, you must specify a **new directory.** Both versions of the software are then available but must not be started simultaneously. The configuration files "*.scl " of the old version can be used in the new version and contain the CLV parameter sets. In order to do so, copy the configuration files from the "data" directory of the old version to the "data" directory of the new version.

Installing the new version over the old one

Before you can install the new version of the software, you must remove the files of the old version – with the exception of the configuration files "*.scl", which contain the CLV parameter sets.

The deinstaller of the old version removes the program files. You can use the deinstaller to remove all of the files (with the exception of the configuration files) or only selected files. The default setting is a complete deinstallation (the configuration files are not deleted). With the custom deinstallation, the files are listed and only selected files are deinstalled. If you choose this deinstallation method, make sure that the main directory containing the configuration files "*.scl" is not deleted. We recommend that you move these files to a different directory and copy them back to the "data" directory later.

1. From the Windows Start menu, choose PROGRAMS and the deinstaller for CLV-Setup. The deinstaller starts and guides you step by step through the deinstallation procedure.
2. Choose the deinstallation method (complete or custom).
3. Install the new version of CLV-Setup as described under *Initial installation,* making sure to choose the same directory.

The new version of CLV-Setup is installed. The configuration files of the old version can be used again.

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10.6.3 Starting CLV-Setup

The "CLV-Setup" program is launched with the following default settings:

Communication	COM 1, 9 600 bit/s, 8 data bits, 1 stop bit, no parity
Transmit control character	Start: STX, Stop: ETX
Receive control character	Start: STX, Stop: ETX
Unit of measure	Metric (depending on the selected installation)
Browser	I-ViewPro™ (if installed), alternatively Netscape Navigator™
Language	As selected for the installation
Company name	As entered for the installation
User name	As entered for the installation
Automatic connection to CLV	On startup: yes On scanner selection: yes When the Terminal Emulator is started/closed: yes
Initial screen	Yes
Storage confirmation prompt	Yes
Last type selected	CLV 41x
File storage location	"data" (configuration files for CLV)

Table 10-7: Default settings in CLV-Setup

1. Switch on the PC and start Windows.
2. Choose CLV-SETUP from the Start menu.
   The SICK logo is then followed by the initial screen.
3. Confirm the initial screen.
   CLV-Setup then checks whether a CLV is connected to the **COM 1** port on the PC (default setting in CLV-Setup) and whether the communication parameters on the PC match those on the CLV. If this is the case, the CONNECTED status is displayed with the CLV specification in the status bar right in the bottom of the screen. The CLV type (here: CLV 490) is displayed in the DEVICE drop-down list in the top right of the toolbar.

The program then loads the internal description of the CLV as well as the default parameter values and displays them on the tabs. Finally, CLV-Setup uploads the current parameter set from the RAM of the CLV and displays the values on the tabs instead of the default values.

You can edit the current parameter set on the tabs. The default values are displayed when the device is used for the first time.

Troubleshooting

If the program cannot establish communication, it outputs a timeout warning and displays NO CONNECTION in the status field. This may be because the CLV is not connected or because the communication parameters on the CLV do not match those on the PC. In this case, CLV-Setup enters the CLV type of the device it last communicated with in the DEVICE field on the toolbar. The default setting the first time the device is used is the CLV 41x. The software then loads the internal device description for this CLV type and displays the default values on the tabs.

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1. Connect the PC to the terminal interface on the CLV using a RS 232 cable (AMV/S 60: connect the PC to the internal 9-pin "Service" plug).
   See *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*.
2. Click (AutoBaud detect) in the toolbar or choose OPTIONS, AUTOBAUD DETECT.
   CLV-Setup scans the serial interface by varying the communication parameters and sends a telegram to the CLV repeatedly. As soon as a response is registered from the CLV, CLV-Setup signals the detected communication parameters. *Fig. 10-36* shows an example of the results of the AutoBaud detect function. The CONNECTED status is displayed right in the status bar in the bottom of the screen.
3. Confirm the AUTO DETECT dialog box with OK.
   CLV-Setup displays the detected CLV type in a separate dialog box and asks you whether you want to upload the current parameter set from the CLV.
4. Confirm the dialog box with Yes.
   CLV-Setup uploads the current parameter set from the RAM of the CLV to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

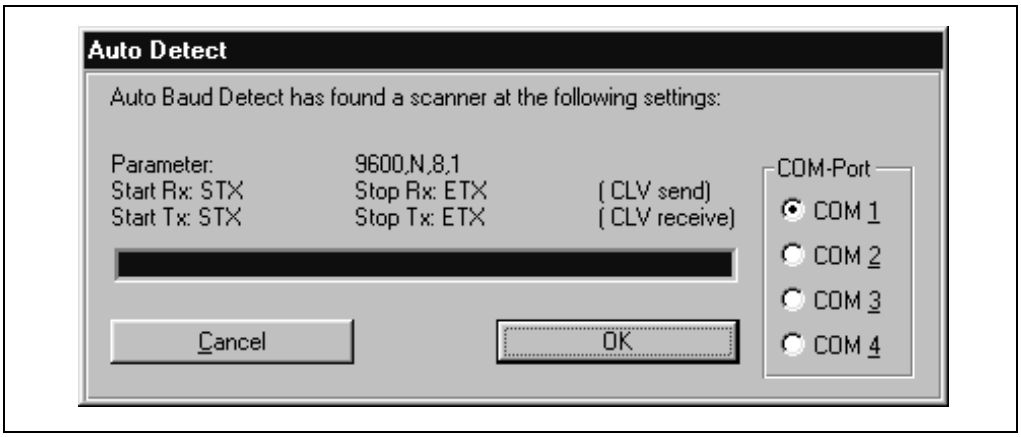

Fig. 10-36: CLV-Setup: Result display of the AutoBaud Detect function

– or–

2. Choose OPTIONS, SERIAL INTERFACE from the menu bar.
   CLV-Setup displays the current communication parameter settings on the PC in the COM PARAMETERS dialog box.
3. Make sure that the communication parameters on the PC and CLV are identical (**connected COM port, 9 600 bit/s, 8 data bits, 1 stop bit, no parity**)
4. Confirm the dialog box with OK.
   CLV-Setup attempts to communicate with the CLV again.
   If it is successful, it displays the CONNECTED status right in the status bar in the bottom of the screen.
5. Click in the toolbar.
   CLV-Setup then uploads the current parameter set from the RAM of the CLV to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

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10.6.4 User interface

The graphical user interface (GUI) of the CLV-Setup is largely self explanatory. The online CLV-Setup Help function provides a description of how to use the program under HELP , PROGRAMM INFORMATION. The GUI is shown in *Fig. 10-37* below (V 3.1).

The GUI comprises the following elements:

- Title bar that displays the program name, current configuration file, and its status, e. g. No File
- Menu bar with pull-down menus
- Toolbar with buttons for triggering various functions
- Drop-down list (top right) for selecting the device type
- Up to 9 tabs (reading configuration, device configuration etc.). The parameters on the tabs are grouped according to their function. Some of these parameters open further dialog boxes.
- Status bar (bottom) with two display fields for the communication between CLV-Setup and the CLV, the PC's interface parameter display, error display field (system errors), device specification field and status display for the connection to the CLV.

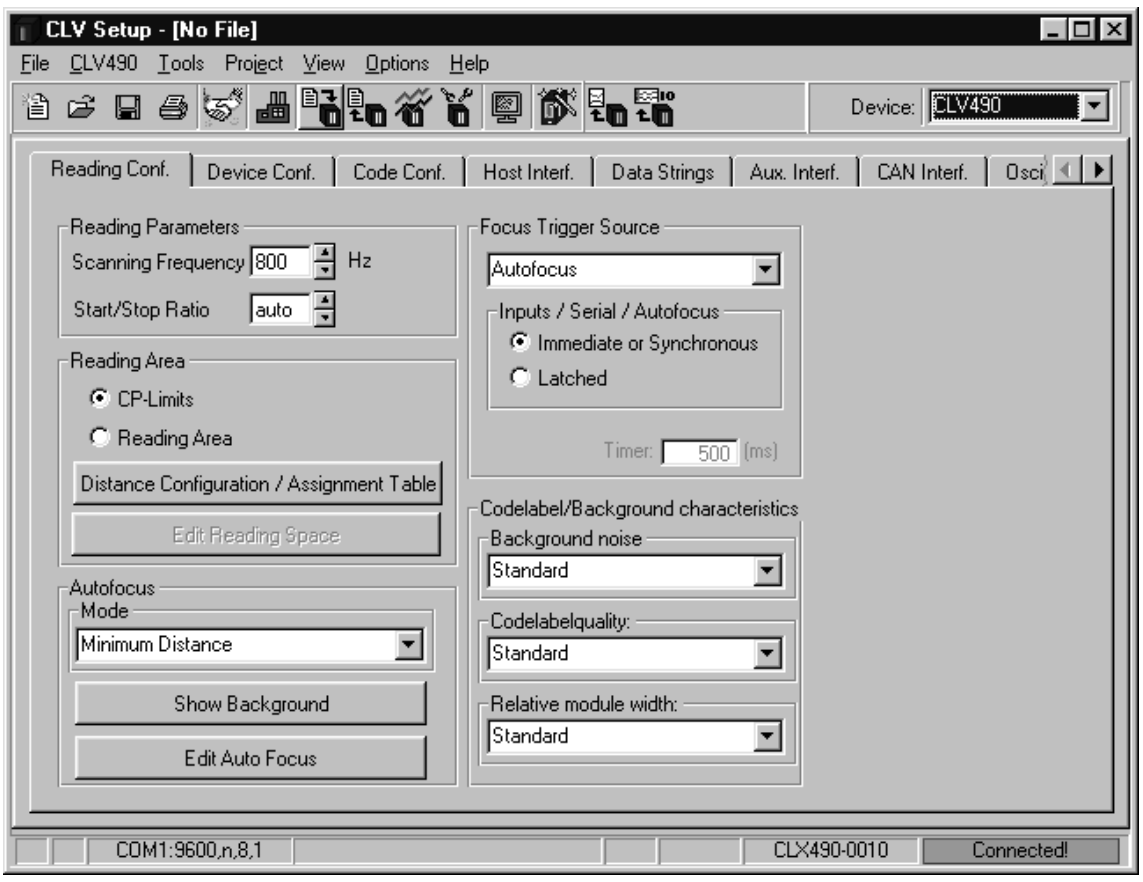

Fig. 10-37: User interface of the "CLV-Setup" software

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10.6.5 Functions

The "CLV-Setup" program features (version V 3.0 and above) the following function to carry out the following:

- Upload the default parameter set from the database
- Automatic communication attempt with the CLV when the program is started
- Automatic software compatibility check in the CLV
- Upload parameter set stored in the CLV
- Change the values on the tabs
- Save the changes to the parameter set in the CLV (download)
- Save the changes to the parameter set as a configuration file "*.scl"
- Print the configuration files
- Export the configuration files in RTF format
- Direct access to the CLV via a Terminal Emulator (select operating mode, start operating functions, log file for communication between the CLV and CLV-Setup, extended Terminal mode, e. g. for displaying CLV messages)
- AutoBaud Detect for automatic communication setup with the CLV
- Select the COM port for adapting the data transfer parameters
- Observation monitor for the CLV host interface's data communication
- Select language setting
- Select units of measure
- Display the last 10 configuration files that were processed
- Save the CLV type that was selected last
- Automatic storage confirmation prompt when changes are made to the configuration file
- Wizards for individual functions
- CLV 490 only: Aligment check to calculate the required setting for angles
- CLV 490 only: Background analysis
- Set switches for starting the program (in the "CLVmain.ini" file)
- Hot keys [F keys] for important functions (using the program without a mouse)
- Start program with SCL file as argument
- Context-sensitive help via the [F1] key

10.6.6 CLV-Setup Help

The procedure for setting the CLV parameters is supported by the online help function, which is displayed in an HTML browser, such as Netscape™ , Internet Explorer™ , or the I-View Pro ™ browser supplied with the program. You can call up context-sensitive help on each parameter as well as a description of its function and permissible values.

1. Press the [F1] key.
   The browser is launched automatically and displays the help topic.
2. If the program cannot find a browser, it asks you to specify the storage location on the hard disk.
   Enter the name of the executable file and the path in the dialog box
   (e. g. "Iviewpro32.exe" in the "Iview" directory).
3. Use the [ALT]+[TAB] keys to switch between the CLV-Setup and CLV-Setup Help applications and prevent several browser windows from being opened.
4. To display an overview of the Help function, Choose HELP, CONTENTS from the CLV-Setup menu bar.

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5. To display information on a tab, click the tab in the top, horizontal frame. The vertical frame on the left-hand side of the screen then displays a list of parameters.
6. Click on a parameter in the list for a description.
   CLV-Setup Help then displays the associated help text in the right-hand frame and jumps to the parameter heading.

10.6.7 Transferring parameter sets between CLV-Setup and the CLV

See *Chapter 6.4.1 Configuring the CLV via the user interface of CLV-Setup, Page 6-5*.

10.6.8 Unknown parameters

Uploading from the CLV

If CLV-Setup does not recognize certain parameters or parameter values when it uploads them from the CLV, it outputs a warning. This may be due to the fact that the CLV is a special model or because the version of CLV-Setup is older than the version on the CLV. CLV-Setup displays the unknown parameters in the window on the EXTRAS tab. The parameters are displayed in the form of command strings and can be edited using the command string conventions. In this way, upward compatibility with the CLV is ensured. When the parameter set is saved as a configuration file in CLV-Setup, these parameters are also included and are also downloaded to the CLV.

Downloading to the CLV

If the CLV does not accept individual parameters or parameter values in the parameter set downloaded with CLV-Setup, it outputs a separate warning for each parameter on the screen. This could be due to the fact that the version of the "CLV-Setup" software is newer than the software version on the CLV and therefore contains new parameters and parameter values that are not implemented in the older software version.

We recommend that you check the effects of warnings in the CLV as follows:

1. Check whether the CLV functions correctly after the parameter set is downloaded.
2. Click in the toolbar.
   CLV-Setup loads the default settings from the database.
3. Click in the toolbar.
   CLV-Setup uploads the problem parameter set from the CLV.
4. Click in the toolbar.
   CLV-Setup prints out the problem parameter set when you confirm the dialog box.
5. Open the previous configuration file "*.scl" for the CLV.
6. Click in the toolbar.
   CLV-Setup prints out the parameter set used up to now when you confirm the dialog box.
7. Compare the two parameter sets.
   To restore the previous status, correct individual parameters in the problem parameter set if necessary and download them to the CLV again.

Opening configuration files "*.scl"

Every time it loads configuration files, CLV-Setup checks whether it recognizes all the parameters/values.
If the program detects an error, it outputs a warning and enters the problem parameter/value in the window on the EXTRAS tab.

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10.6.9 Log file in the Terminal Emulator

The Terminal Emulator can log the communication between CLV-Setup and the CLV. CLV-Setup stores the data transmitted in both directions with the following identifiers:

--> PC: CLV sending to CLV-Setup

PC --> CLV receiving from CLV-Setup

1. Click in the toolbar.
   The Terminal Emulator window opens.
2. Click the empty checkbox in front of the WRITE LOGFILE option on the right.
   The SAVE LOGFILE AS ... dialog box opens.
3. Enter a file name with the extension ".log" and exit the window by choosing SAVE.
   CLV-Setup saves the file in the "data" directory and records an entry in the log file.
4. To deactivate the log function, click the checkbox in front of the WRITE LOGFILE option again or close the Terminal Emulator window.

10.6.10 Starting CLV-Setup with an "INI file" as an argument

When the program is started, CLV-Setup can also be transferred the name of an "INI file" as a parameter. To do so, enter "/INI" in front of the file.

Example:
"CLVmain32.exe**data**\Set1_490.scl /INI user.ini "

CLV-Setup is launched with the initialization data contained in the "user.ini" file and loads the configuration file "Set1_490.scl" from the "data" directory straight away.

The "user.ini" file must be stored in the same directory as "CLVmain32.exe".

You can use this method to link CLV-Setup to several different configurations on your Windows desktop.

In this way, for example, you can prevent CLV-Setup from attempting to establish a connection when a CLV is not connected.

10.6.11 The CLV Assistant

The CLV assistant is not suitable for parameterizing the CLV 490.

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10.7 Configuring a CLV with command strings

The CLV can be parameterized and operated with command strings via the terminal interface or the host interface. Parameters which are unknown to the CLV-Setup may be used providing that the command string convention is followed. This allows, among other things, the setting of special devices as well as the configuration of new CLV parameters (which are unknown to "CLV-Setup" program) if your version of the CLV is older in comparison. The "CLV-Setup" user interface is based on the command language.

The command language accesses the CLV's command interpreter directly. Use this language with care. Commands sent to the CLV are carried out immediately.
Parameter values changed by commands are at first only activated in the current parameter set in the CLV's RAM. The altered parameter values must be saved to non-volatile memory in the EEPROM (after the changes are made) using a special command. If the values are not saved, they will be lost when the voltage supply is cut off.

The "CLV-Setup" Terminal Emulator's online mode makes it possible to parameterize the CLV with command strings directly. *Fig. 10-38* shows a view of the Terminal Emulator with command lines and PC/CLV communication output windows.

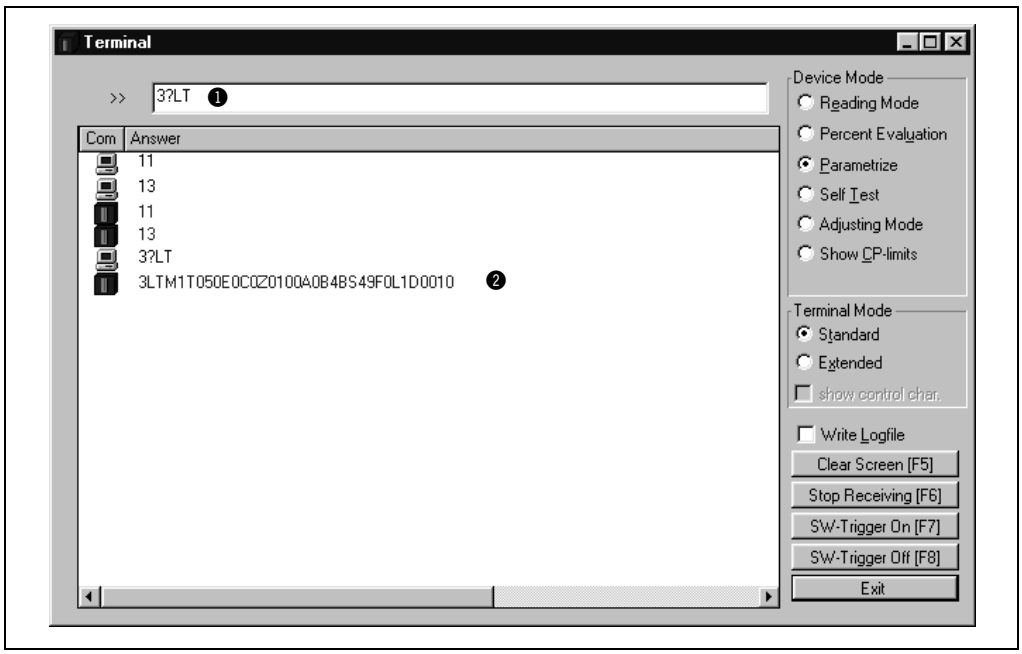

Fig. 10-38: CLV-Setup: entering commands in the Terminal Emulator

1. Click on in the symbol bar.
   The Terminal Emulator window opens. The CLV is in Reading mode.
2. Under DEVICE MODE, click on the PARAMETERIZING option field.
   The CLV aborts reading mode. The "Device Ready" LED extinguishes.
   CLV-Setup switches the CLV into the parameterize mode with a command.
   All commands in parameterize mode begin with "3".
3. Enter the desired command in command line ①, and press the <Return> key.
   The command is sent to the CLV.
   The CLV answers with an echo if the command was syntactically correct (in most cases).

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Example:
The command "3?LT" causes the CLV to display the parameter values of the reading trigger in coded form in output window ②.

4. To return to Reading mode, click on the READING MODE option field.
   The "Device Ready" LED lights up.

Note The parameter values directly changed with command strings in the CLV are registered and shown only after the parameter set is uploaded from the CLV.

A list of command strings, is available on request.

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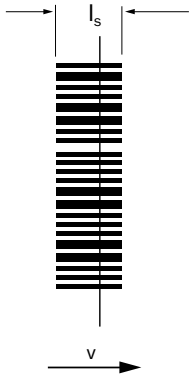
10.8 Calculating parameter values for setting the CLV

10.8.1 Calculating the number of scans (for standard decoders)

The maximum number of scans possible for a bar code depends on the conveyor velocity v.

Line scanner: ladder-type bar code arrangement

Line scanner: lateral reading at object



Calculation for standard decoder!

$$v = \frac{s}{t}$$

$$v = \frac{l_s}{n \times t_{scan}}; \quad t_{scan} = \frac{1}{f}$$

$$v = \frac{l_s}{n} \times f$$

$$n = \frac{l_s}{v} \times f$$

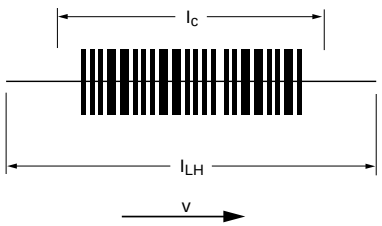
Specified values:
Number of scans n = ?
Convoyer velocity v = 1.5 m/s
Bar length l_S = 20 mm
Scanning frequency f = 600 Hz
Bar code 100 % readable

$$n = \frac{0.02\ m}{1.5\ m/s} \times 600/s \qquad \mathbf{n = 8}$$

Fig. 10-39: Line scanner: calculating the number of scans for ladder-type bar code arrangements

Line scanner: fence-type bar code arrangements

Line scanner: lateral reading on object



Calculation for standard decoder!

$$v = \frac{s}{t}$$

$$v = \frac{(l_{LH} - l_c)}{n \times t_{scan}}; \; t_{scan} = \frac{1}{f}$$

$$v = \frac{(l_{LH} - l_c)}{n} \times f$$

$$n = \frac{(l_{LH} - l_c)}{v} \times f$$

Specified values:
Number of scans n = ?
Convoyer velocity v = 2 m/s
Code length with blanc zone l_c = 150 mm
Reading field height l_{LH} = 400 mm
Scanning frequency f = 600 Hz
Bar code 100 % readable,
all scans on the code
Code window $s = l_{LH} - l_C$

$$n = \frac{(0.4 - 1.5)\ m}{2\ m/s} \times 600/s \qquad \mathbf{n = 75}$$

Fig. 10-40: Line scanner: calculating the number of scans for fence-type bar code arrangements

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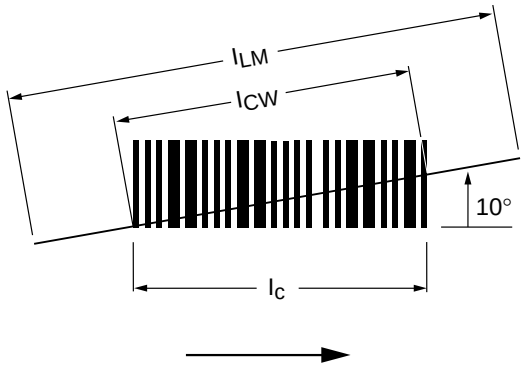
Line scanner with oscillating mirror: fence-type bar code arrangement

Line scanner with oscillating mirror: side read on object



Calculation for standard decoder!

Specified values:
Number of scans n = ?
Conveyer velocity v = 0.5 m/s
Code length with blanc zone l_c = 100 mm

Code length under 10°: $l_{CW} = \frac{100\ mm}{\cos 10} = 102\ mm$

Reading field height l_{LH} = 500 mm
Scanning frequency f = 600 Hz
Bar code 100 % readable, all scans on the code
Code windows = $l_{LH} - l_c$

1. Dwell time of the bar code in the reading area:

$t = \frac{s}{v}$

$t = \frac{(l_{LH} - l_{CW})}{v}$

$t = \frac{(0.5 - 0.102)}{0.5\ m/s}$

$\underline{t = 796\ ms}$

2. Required oscillating mirror frequency:

$f_{SW} = \frac{1}{t}$

$f_{SW} = \frac{1}{0.796\ s}$

$f_{SW} = \underline{1.26\ Hz}$

3. Number of possible scans (rough estimate):

$n = \frac{f}{f_{SW}}$

$n = \frac{600\ Hz}{1.26\ Hz}$

$\underline{n = 476}$

Fig. 10-41: Line scanner with oscillating mirror: calculating the number of scans for fence-type bar code positioning

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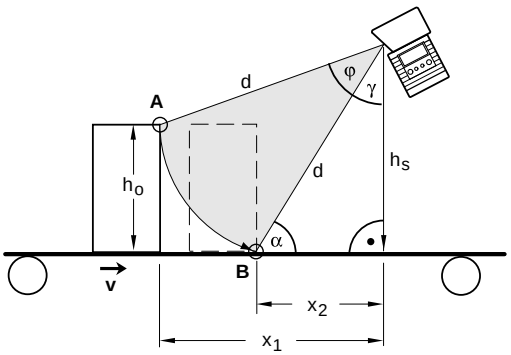
10.8.2 Calculating the start position and mirror speed for the forward and return phase of the One-Shot function

Line scanner with oscillating mirror

Theoretical calculation: reading from the front (object moving towards CLV)

Calculation for Standard decoder!



(Scanning direction is vertical to drawing plane)

Legend:

h_0 = Max. object height
h_S = Distance of the CLV across conveyor level
φ = Oscillating angle
α = Max. angle of impact on bar code (skew)
Start Phase 1: Point A
Start Phase 2: Point B

Specified values:

$h_S > h_0$
$\alpha \leq 45°$ (better: $\alpha \leq 30°$)
Set max. deflection angle: ±20°

➢ Determine distances through measurement:
x_1 = Distance at Start Phase 1
x_2 = Distance at Start Phase 2

1. Focus position for distance configuration:

$$\sin\alpha = \frac{h_s}{d} \quad \Rightarrow \quad d = \frac{h_s}{\sin\alpha}$$

2. Oscillating angle φ

$$\gamma = 90° - \alpha$$

$$\cos(\varphi + \gamma) = \frac{(h_s - h_0)}{d}$$

$$\varphi = \text{arc cos}\left(\frac{(h_s - h_0)}{d}\right) - \gamma$$

➢ Enter φ symmetrically to CW = 50:

$$\text{StartPos 1} = 50\ \text{CW} + \left(\frac{\varphi}{2} \times \frac{1\ \text{CW}}{0.5}\right)$$

$$\text{StartPos 2} = 50\ \text{CW} - \left(\frac{\varphi}{2} \times \frac{1\ \text{CW}}{0.5}\right)$$

3. Mirror speed $\varphi^{*)}$:

$$v = \frac{\Delta x}{\Delta t};\ \Delta x = x_1 - x_2$$

$$\varphi^* = \frac{\Delta\varphi}{\Delta t}$$

During the period Δt, in which the object moves from x_1 to x_2 the oscillating mirror must also pass through the angle $\Delta\varphi$

$$\Rightarrow \frac{\Delta x}{v} = \frac{\Delta\varphi}{\varphi^*}$$

$$\varphi^* = \Delta\varphi \times \frac{v}{\Delta x} \quad \text{where} \quad 1\ °/s = 2\ \text{CW/s}$$

When entering the values, note the following:
– Debouncing time of the Sensor 2 switching input (One-Shot trigger)
– Start time of the oscillating mirror (inertia)

➢ Select the mirror speed of the return phase, in accordance with the distances between the objects, so that the scan line returns to the starting position (Point A) at the right time.

➢ Check the theoretically calculated values on site and adapt them if required.

Fig. 10-42: One-Shot: Line scanner with oscillating mirror: calculating the number of scans for fence-type bar code positioning

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10.8.3 Calculating the necessary bar code distance if several bar codes are read on each object

SMART Decoder:
for bar codes with identical code type and identical or different data contents.

Distance dx: min. 60 x module width
e. g. 30 mm for module width 0.5 mm

Distance dy: 7 x d_{scan}
where d_{scan} = vertical distance between two consecutive scan lines

e. g. scan line 90 to bar code, scanning frequency 800 Hz, v = 2 m/s

$$dscan = \frac{V}{f} \qquad dscan = \frac{2000\ mm/s}{800\ /s} = 2.5$$

dy = 7 x 2.5 mm = 17.5 mm

Standard Decoder:
The above distances are also required for reading bar codes with identical names (identical data content and code types).

Prerequisite for separating bar codes with identical names:
1. The CODE DISTANCE between the bar codes must be parameterized correctly (DEVICE CONFIGURATION tab, EDIT TRACKING PARAMETERS button)
2. The code position comparison must be activated (CODE CONFIGURATION tab, under CODE POSITION)

Bar code lines in conveyor direction:
If the scan line is to detect bar codes of the same name with the same code position, the travel information must be supplied by an external incremental sensor or the internal INC timer so that the bar codes can be distinguished from one another.

Rule of thumb: the blank zone should surround the bar code completely!

Fig. 10-43: Required distance between the bar codes on an object

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10.9 Tables

10.9.1 Calculating the code length of a bar code

The code length of a bar code is the number of useful characters in the printed code including the check digit (if present). This code length must be specified in CLV-Setup.

If the code type of a bar code is known, the code length can be calculated by counting the bars and gaps. The relevant formulas are provided in *Table 10-8*.

1. Count the bars and gaps as specified in *Table 10-8*.
   Do not forget to include the start and stop characters.
2. Calculate the code length using the formula in the table.
3. Enter the value in CLV-Setup as described in column 4 in the table.

Code type	**Count**	**Calculation of code length**[1)2)]	**Entry in CLV-Setup**
Code 39	Number of bars	$I_{Code} = \frac{\text{Number} - 10}{5}$	Calculated code length
2/5 Interleaved	Number of wide elements (bars and gaps)	$I_{Code} = \frac{\text{Number} - 1}{2}$	Calculated code length
EAN	Not applicable	13 characters (normal version) 8 characters (short version)	Activate 13-digit Activate 8-digit
UPC	Not applicable	12 characters (UPC A, normal version) 6 characters (UPC E, short version)	Activate Version A Activate version E
Codabar	Number of bars	$I_{Code} = \frac{\text{Number} - 8}{4}$	Calculated code length
Code 128 (character set A)	Number of bars	$I_{Code} = \frac{\text{Number} - 10}{3}$	Calculated code length
Code 93	Number of bars plus separator after the stop character	$I_{Code} = \frac{\text{Number} - 13}{3}$	Calculated code length
EAN 128	Number of bars	$I_{Code} = \frac{\text{Number} - 10}{3}$	Calculated code length

1) Check digit optional for Code 39, 2/5 Interleaved, Codabar.
Check digit always integrated in printed bar code with EAN, UPC, Code 128, Code 93, EAN 128 (suppressed automatically when the CLV read result is output)

2) With only few exceptions each printed character that has to be decoded corresponds to an ASCII character.
With Code 39 extended, Code 93, Code 128 and EAN 128, the number of characters in the data string of the CLV can be larger than the number of characters in the printed code because it comprises several character sets.

Table 10-8: Formulas for calculating the code length of a bar code

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10.10 Discussion of a parameterization example

10.10.1 Application Conditions

- Reading with the CLV 490's autofocus function
- Reading the packages from above
- Barcode with lines running vertically on the top side of the package, tilt across from the scan line: ±30°
- Package height: 100 ... 600 mm, package width: 200 ... 550 mm, packages not guided
- Conveyer velocity: v = 1 m/s, conveyer belt width: 600 mm
- Object distance between packages: min. 300 mm
- Barcode: 2/5 Interleaved, module width 0.4 mm, line length 15 mm, PR 2.5:1, Quality 3 or 4, 14 characters with test code (mod 10)
- Do not read under plastic sheeting, do not use very dark packages (spectral reflection > 20 %)
- 1 barcode per package
- Reading pulse is through a SICK photoelectric switch
- Output of read results via the host interface
- Parameterization of the CLV based on the factory defaults

Requirements:

- Testing the application for feasability with the CLV 490 before buying, with the help of the SMART calculation sheet (service provided by SICK)
- Choice of CLV type: here standard density line scanner (CLV 490-0010)
- No objects irrelevant for reading portruding into conveyor path

Tools:

- Measuring tape (up to 3 000 mm)
- Protractor (to set up the CLV)
- A PC with Windows and the SICK software "CLV-Setup"
- RS-232 interface (pin 2 and pin 3 crossed), e. g. no. 2 014 054
- These operating instructions

10.10.2 Purpose of this discussion

- To make important clarifications
- To indicate the fitting location of the CLV
- To point out the parameters to be set in the CLV-Setup user interface

10.10.3 Instructions for solution – step by step

- ➢ Determine the reading range and CLV's installation height over the conveyor belt
- ➢ Determine the CLV's distance measurement type
- ➢ Mount the CLV
- ➢ Parameterize the CLV
- ➢ Test an application

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10.10.4 Important clarifications

➢ Sketch out the reading situation and enter the parameter values and variables for the CLV.

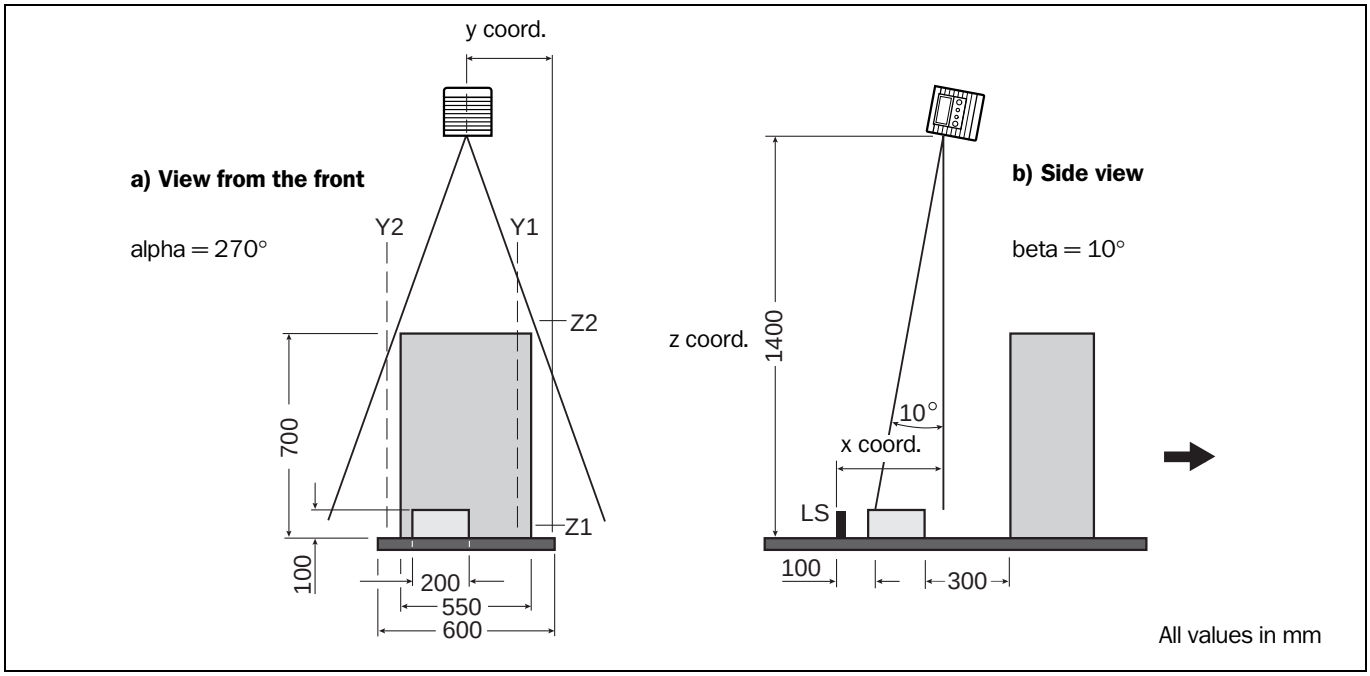

Fig. 10-44: Parameterization example: prepare a sketch of the reading situation

➢ Determine the reading range and installation height of the CLV above the conveyor belt: With a covered conveyor belt with a 600 mm width, the CLV can read an object at a distance of 600 mm (according to the reading field diagram in *Fig. 10-1, Page 10-3*). For a reserve of an additional 100 mm and a maximum package height of 600 mm, the resulting reading range of the CLV can be set to 700 ... 1 300 mm from the reading window. The CLV is to be mounted 1 400 mm above the conveyor belt, as the package must be at least 100 mm high.

➢ Determine the CLV's distance measurement type:
For the required total field depth range of 600 mm, a height detection of the focal position changeover is required. This is carried out by activating the CLV's direct distance measurement (the basis of the autofocus function).

10.10.5 Mounting and electrical connection

1. Mount the CLV centered 1 400 mm above the conveyor belt (vertically) according to a) *Fig. 10-44* , reading window facing downward.
2. Align and screw in the CLV in a reading axis with the reading window at a 10° angle against the required reading direction as shown in b) *Fig. 10-44*
The CLV can carry out a distance measurement from the front of the package to the top of the package while it is in motion.
3. Attach the pulse photoelectric switch and reflector to the conveyor belt so that there is a distance of approx. 100 mm between the photoelectric switch and the scan line position on the package with the smallest height.
4. Connect the CLV to the AMV/S 60 connection module.
(see *Chapter 5.2.3 Connections/cables for the AMV/S Connection Module, Page 5-3*)
5. Connect the pulse photoelectric switch to the AMV/S 60 connection module
(see *Chapter 5.5.7 Connecting the switching inputs, Page 5-16*).
6. Turn on the supply voltage to the CLV.

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10.10.6 Parameterize the CLV with the "CLV-Setup" program

1. Connect the PC to the CLV's terminal interface (see *Chapter 5.5.5 Connecting the CAN interface, Page 5-15*)
2. Start Windows and the "CLV-Setup" program on the PC.
3. Invoke the CLV 490's default setting in the "CLV-Setup" program (see *Chapter 6.1 Overview of steps for starting up the CLV, Page 6-1*).
4. Parameterize the CLV with the help of *Chapter 6.4.4 Guide to parameterization menu, Page 6-8* and the tab cards by following the steps described.
5. After completing parameter value alterations, download them to the CLV! (see *chapter Chapter 6.4.1 Configuring the CLV via the user interface of CLV-Setup, Page 6-5*).

1. Setting up the autofocus function (Part 1): READING CONFIGURATION tab

➢ Set the following parameters:

– Scanning frequency: **800 Hz**

– Start/stop ratio: **auto**

– Trigger for focus position changeover: **autofocus**

– Autofocus mode: **differential background**

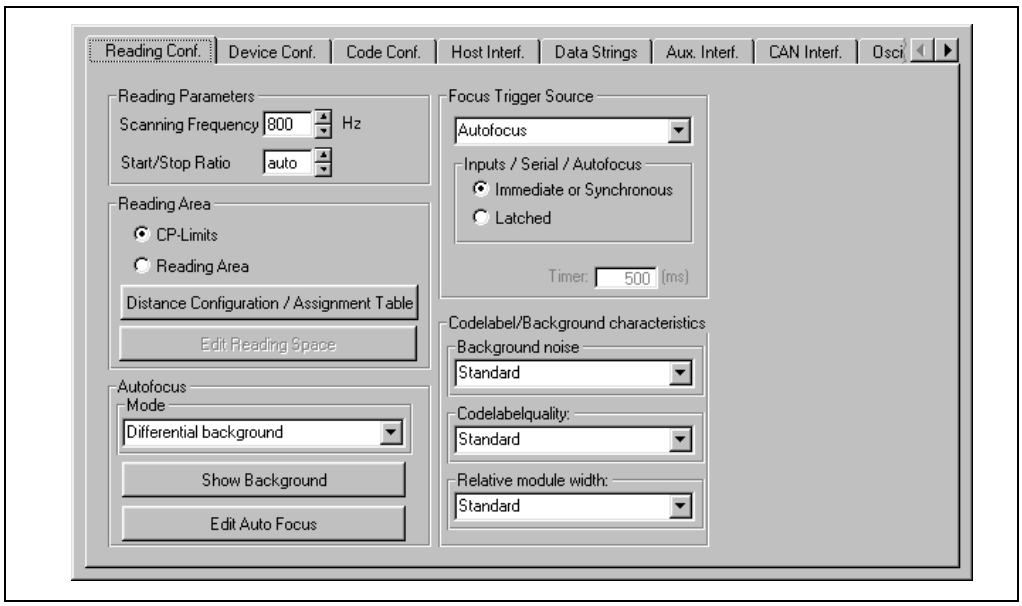

Fig. 10-45: Parameterization example: settings on the "Reading Configuration" tab

➢ Click on the EDIT AUTOFOCUS button.
The EDIT AUTOFOCUS dialog window then opens.

➢ Set the following parameters on the ADJUSTMENTS tab (*Fig. 10-46, Page 10-59*):

– Preference of focus distance: **Fix focus position: 1 200 mm**
(approx. 100 mm above the packet with the smallest height)

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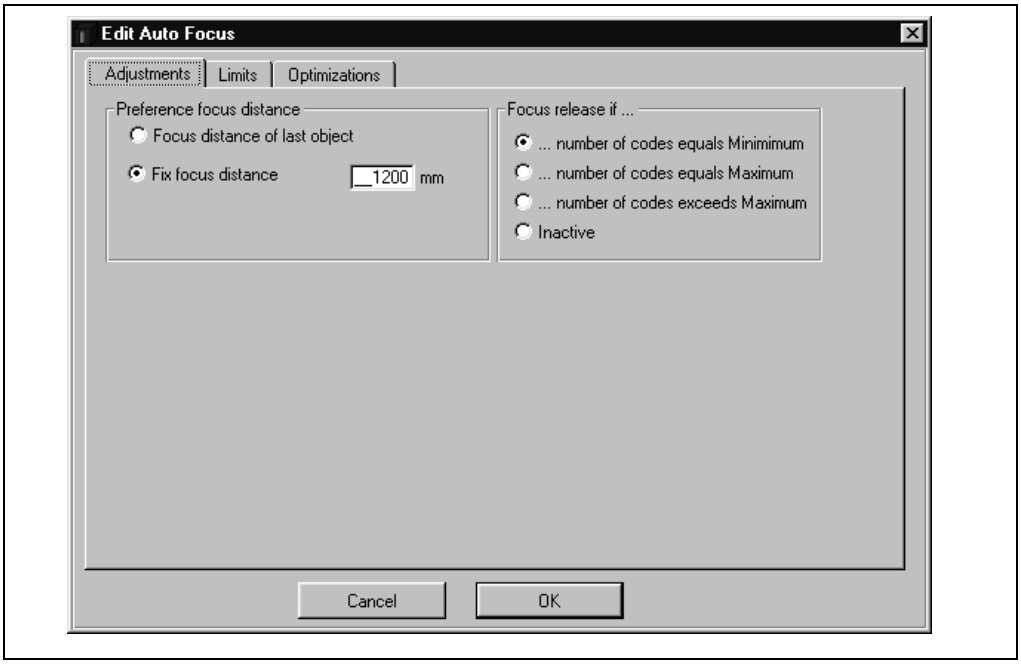

Fig. 10-46: Parameterization example: "Edit Auto Focus/Adjustments" dialog window

- To set the **background**, switch to the LIMIT VALUES tab in the same dialog window (*Fig. 10-47*). The background is formed using the autofocus area's terminating planes. The CLV registers the altered reading distances in this area only.
  - Autofocus limitation: min: **600 mm**; max: **1 400 mm**
  - Autofocus space: (Limiting levels from feed level)
    - Right edge of conveyor (Y1): **50 mm**
    - Left edge of conveyor (Y2): **550 mm**
    - Level of conveyor (Z1): **50 mm**
    - Maximum scanning height (Z2): **800 mm**

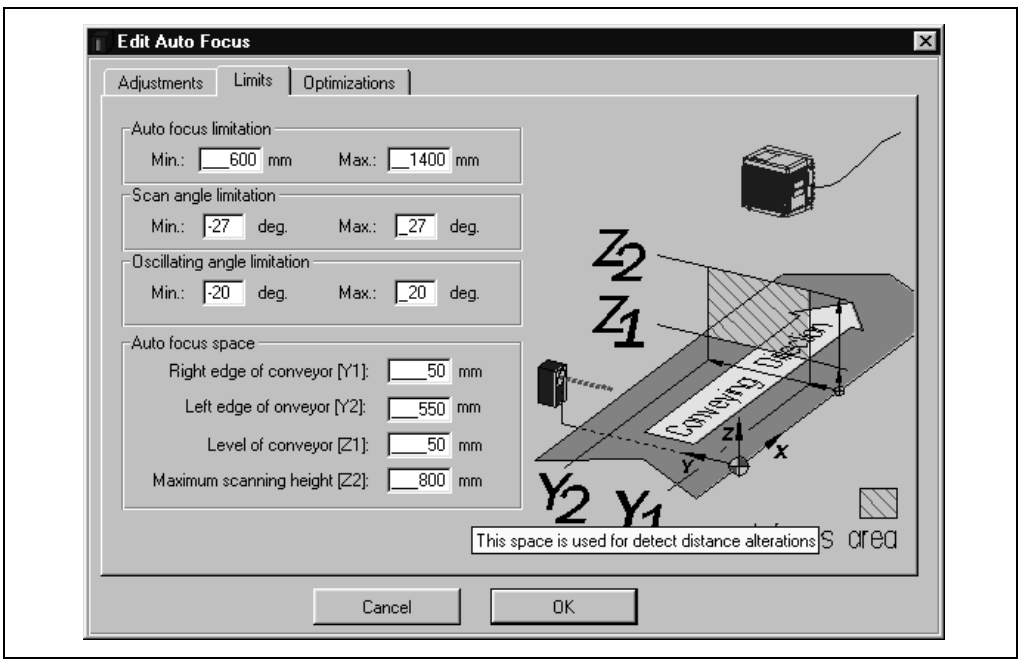

Fig. 10-47: Parameterization example: "Edit Auto Focus/Limits" dialog window

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➢ Set the following parameters on the OPTIMIZATION tab (*Fig. 10-48*)

– Delay of focus change

Timeout: **50 ms**

Hysteresis: **50 mm**

– Distance Measurement: **active**

– Source of Distance information**: internal**

– Smooth filter active: **active** Length: **3**

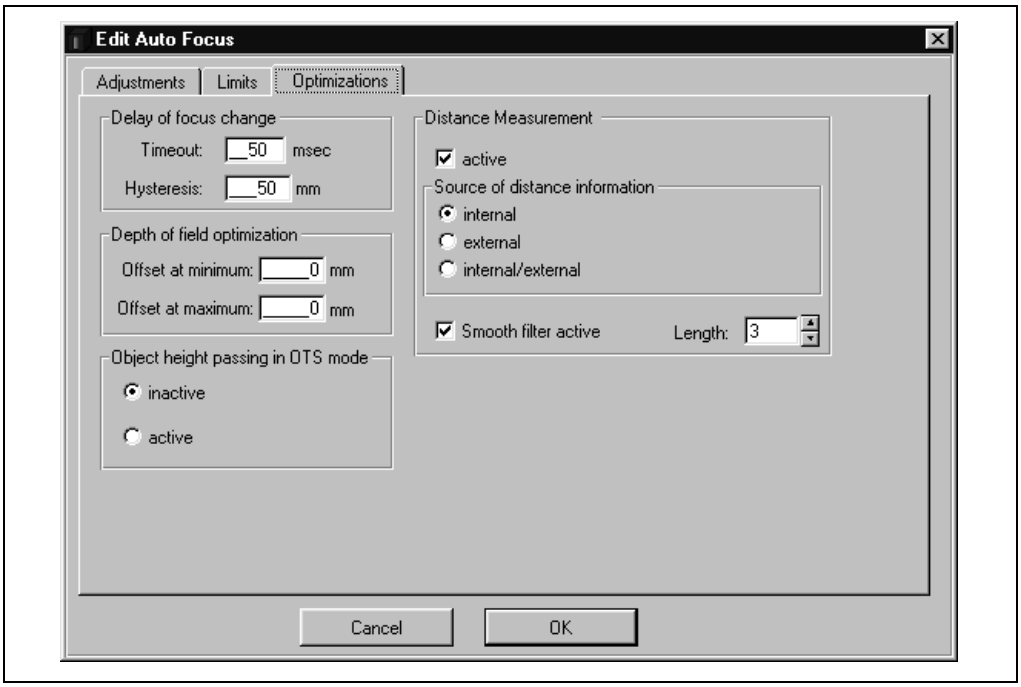

Fig. 10-48: Parameterization example: "Edit Auto Focus/Optimizations" dialog window

➢ Confirm the dialog window by clicking "OK".

2. Setting up the autofocus function (Part 2): DEVICE CONFIGURATION tab

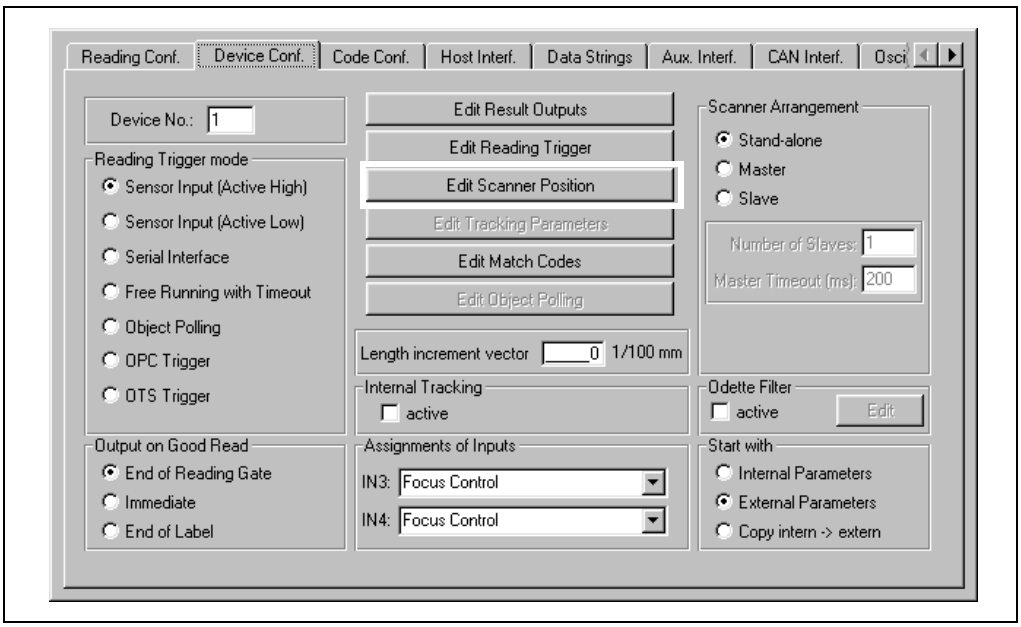

Fig. 10-49: Parameterization example: Buttons on the "Device Configuration" tab

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➢ Click on the EDIT SCANNER POSITION tab.
The EDIT SCANNER POSITION dialog window then opens.

Set the following CLV position definition parameters regarding the movement level (*see also Fig. 10-44, Page 10-57*):

➢ Set the following parameters on the ANGLES tab:

– Angle alpha: **90 degrees** (Laser beam's direction of deflection relative to the direction of convoyer belt.
– Angle beta: **10 degrees** (Laser beam's angle of incidence relative to the perpendicular in the area (Skew to the barcode), 10 degrees in the direction of feed)
– Angle gamma: **0 degrees** (Divergence of the scanner (reading windows) from the perpendicular in the plane askew to the direction of feed)

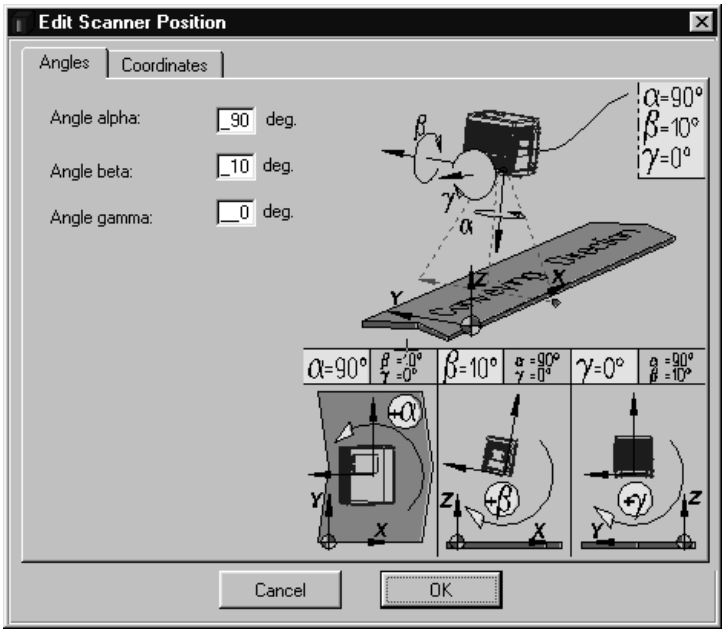

Fig. 10-50: Parameterization example: "Edit Scanner Position/Angles" dialog window

➢ Set the following parameters on the COORDINATES tab, see *Fig. 10-51, Page 10-62*

– X coordinate: Measure **the distance from the pulse photoelectric switch to the CLV's reading window perpendicular!**
(x offset + x coordinate = the distance from the pulse photoelectric switch to the CLV's reading window perpendicular)
– Y coordinate: **300 mm** (The middle of the CLV to the left edge of the conveyor belt in the direction of convoyer belt)
– Z coordinate: **1 400 mm** (Height of the CLV above the conveyor belt)

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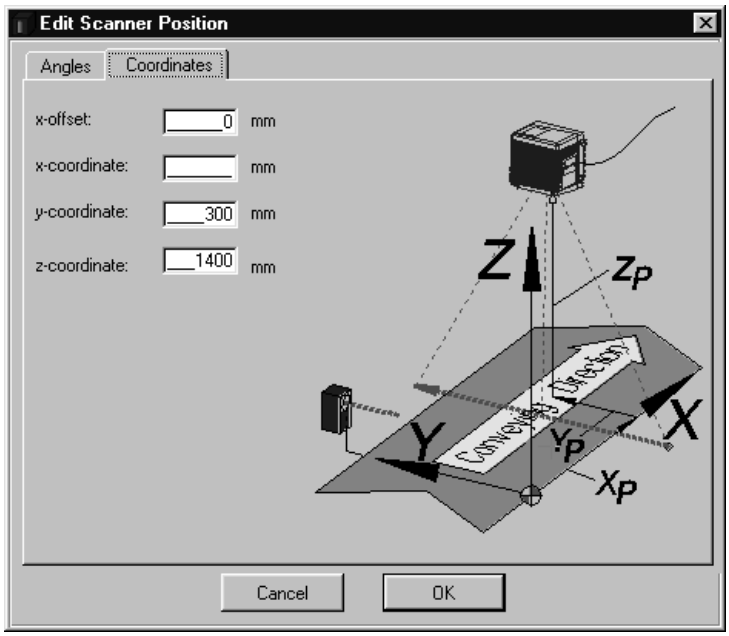

Fig. 10-51: Parameterization example: "Edit Scanner Position/Coordinates" dialog window

➢ Confirm the dialog box with "OK".

3. Set the reading pulse source: DEVICE CONFIGURATION tab

➢ In the READING TRIGGER MODE group click the option **Sensor Input (Active High)**.

➢ In the Output on Good read group click the option **End of label**.

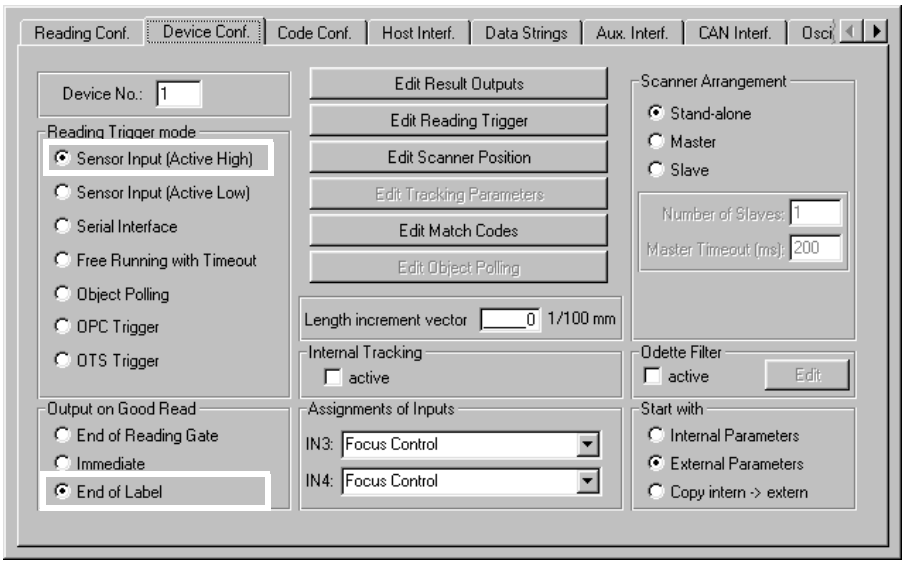

Fig. 10-52: Parameterization example: Settings on the "Device Configuration" tab

➢ Confirm the dialog box with "OK".

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4. Set the evaluation properties: CODE CONFIGURATION tab

➢ Set the following parameters:
- Codes: **2/5 Interleaved; deactivate all other code types!** (remove check)
- Number of Codes: **Minimum 1**, **Maximum 1**
- Code Positions: **deactivate** (remove check)
- Decoder: **SMART/Standard**

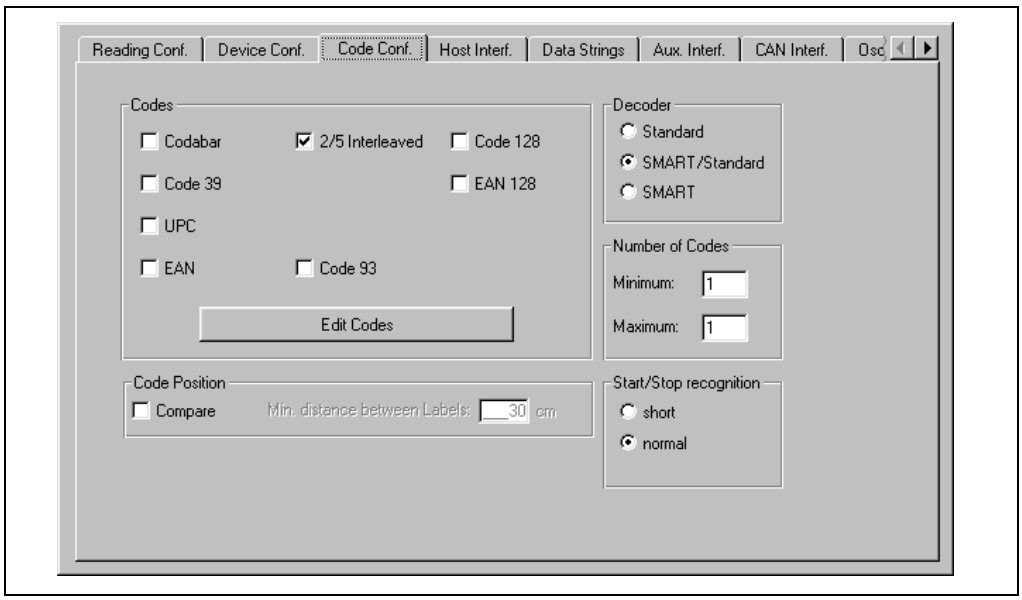

Fig. 10-53: Parameterization example: settings on the "Code Configuration" tab

➢ Click on the EDIT CODES button.

➢ Set the following parameters on the 2/5 INTERLEAVED tab in the dialog window:
- Code Length: **Fixed**; length 1: **14 characters**
- Multiple Reads for Length 1: **3**
- Check Digit Test for Length 1: **mod 10**
- Transmit Check Digit: **activate**
- Transmit Leading Zero: **activate**

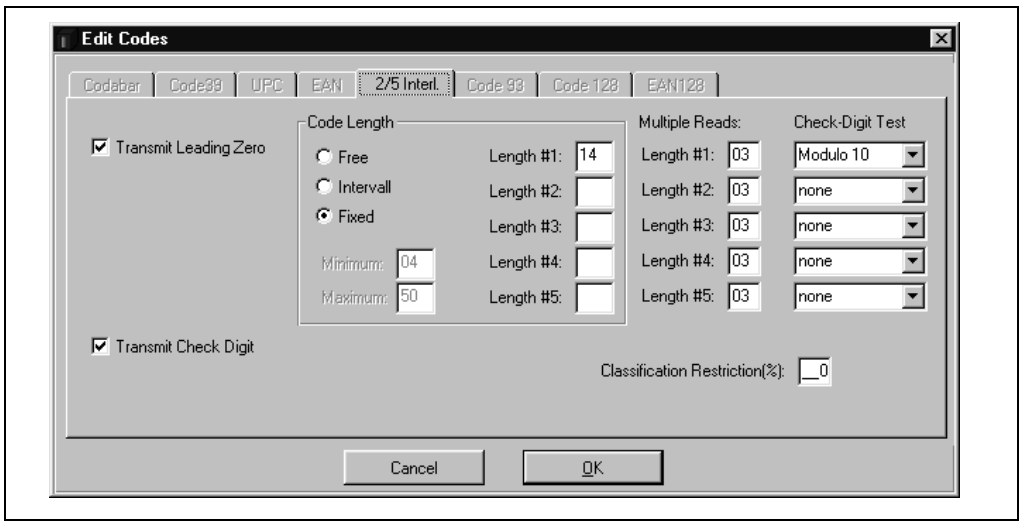

Fig. 10-54: Parameterization example: "2/5 Interleaved" tab

➢ Confirm dialog box with ”OK”.

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5. Set the output properties: HOST INTERFACE tab

➢ Set the CLV's end-user communication condition parameters

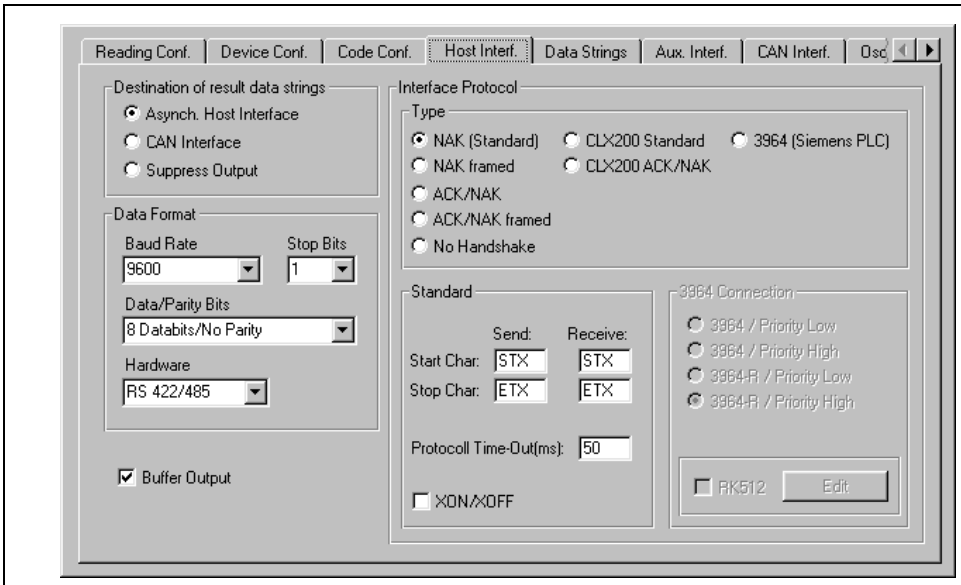

Fig. 10-55: Parameterization example: "Host interface" tab (base setting)

DATA STRINGS tab

➢ Set the CLV output message format in the end-user communication conditions

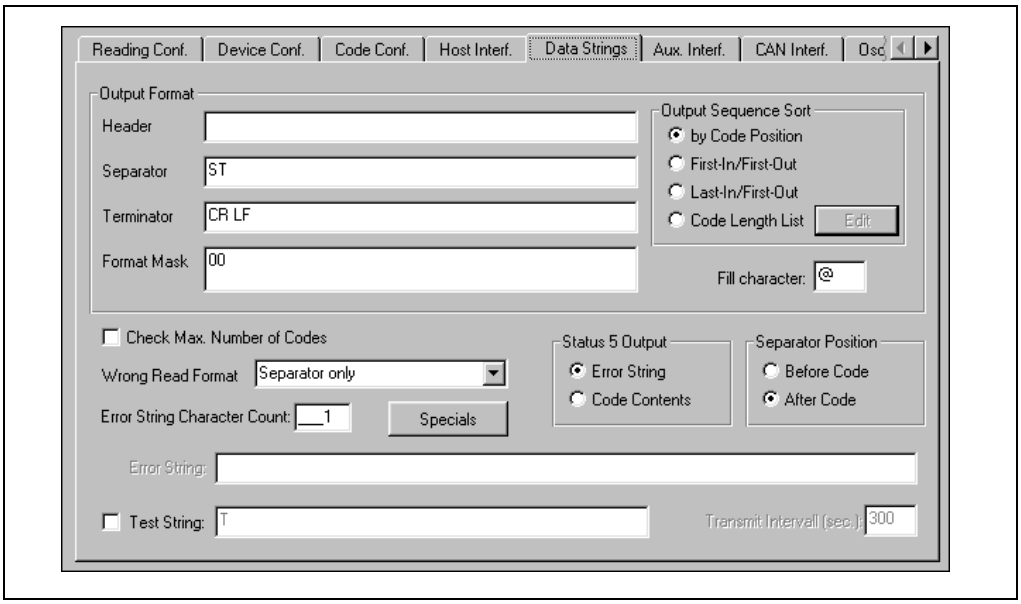

Fig. 10-56: Parameterization example: "Data Strings" tab (basic setting)

➢ Perform download to CLV.

10.10.7 Testing the application

➢ Check the reading rate with the Terminal Emulator in the CLV-Setup while an application is running.
The reading rate should be > 90%.

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10.11 Special applications and procedures

10.11.1 Auxiliary input

If the CLV cannot read a bar code in Reading mode (e. g. if there is no bar code on the object), the data content of the bar code can be sent subsequently to the host by using the "Auxiliary input" function. In this way, the sequence of reading results can be completed if necessary.

The auxiliary input function uses the terminal interface of the CLV exclusively and features two options:

- Manual entry of the data content on the keyboard of a connected terminal or PC (Terminal Emulation function)
- Entry of the bar code using a hand-held reader. The data is then forwarded to the CLV via an internal or external decoder.

Fig. 10-57 shows the basic auxiliary input principle.

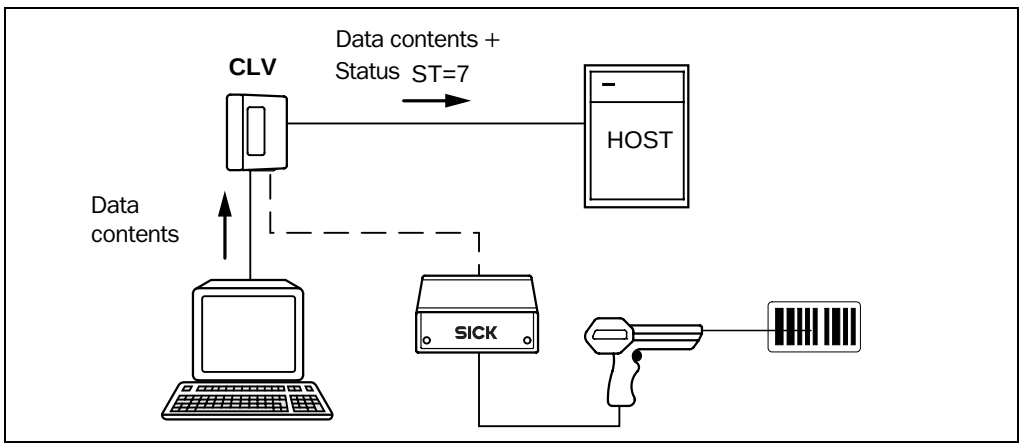

Fig. 10-57: Auxiliary input via the terminal interface of the CLV

The CLV sends the data content of the bar code that it receives via the terminal interface to the host in the same format as the other reading results on the host interface. Each string can contain the data from a bar code with a maximum length of 50 characters. The CLV automatically enters the status ST = 7 if the error status has been enabled for transmission. The values of the other reading diagnosis data in the data string do not have any significance.

To enable the CLV to receive the data content of the bar code on the terminal interface, you must switch the operating mode on the interface to auxiliary input .

1. Connect the PC to the **terminal interface** on the CLV using an RS 232 data connection cable (AMV/S 60: connect the PC to the internal 9-pin "Service" plug).
   See Chapter 5.5.5 Connecting the CAN interface, Page 5-15.
2. Start CLV-Setup on your PC.
   See *Chapter 10.6.3 Starting CLV-Setup, Page 10-43*.
3. Choose the AUXILIARY INTERFACE tab.
4. Choose the AUXILIARY INPUT option from the drop-down list.
5. Download the changes to the CLV by clicking in the toolbar .
   The DOWNLOAD PARAMETERS dialog box is then displayed.
6. Confirm the dialog box by choosing the TEMPORARY storage option.

The terminal interface then operates temporarily in "Auxiliary input" mode.

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Entering the bar code using the Terminal Emulator function in CLV-Setup

1. Click on the toolbar.
   The Terminal Emulator is launched.
   The CLV is in Reading mode.
2. Click the EXTENDED radio button in the TERMINAL MODE section.
   The start and stop characters used by the Terminal Emulator are displayed at the top of the screen, on the left and right of the text input field.
   Fig. 10-58 shows the Terminal Emulator window in extended mode.
3. Use the drop-down lists to set the start and stop characters to NUL.
4. Enter the data content of the bar code (character string) on the keyboard.
   Use the backspace key to correct any input errors.
   The data content must not contain control characters.
5. Press the [RETURN] or [ENTER] key.
   The CLV then interprets all further characters as a new data string.
   CLV-Setup sends the character string to the CLV and deletes the entry in the text field.
   The CLV does not send an echo.
6. Once the active reading pulse has ended, the CLV sends the data received from the PC to the host via the host interface.

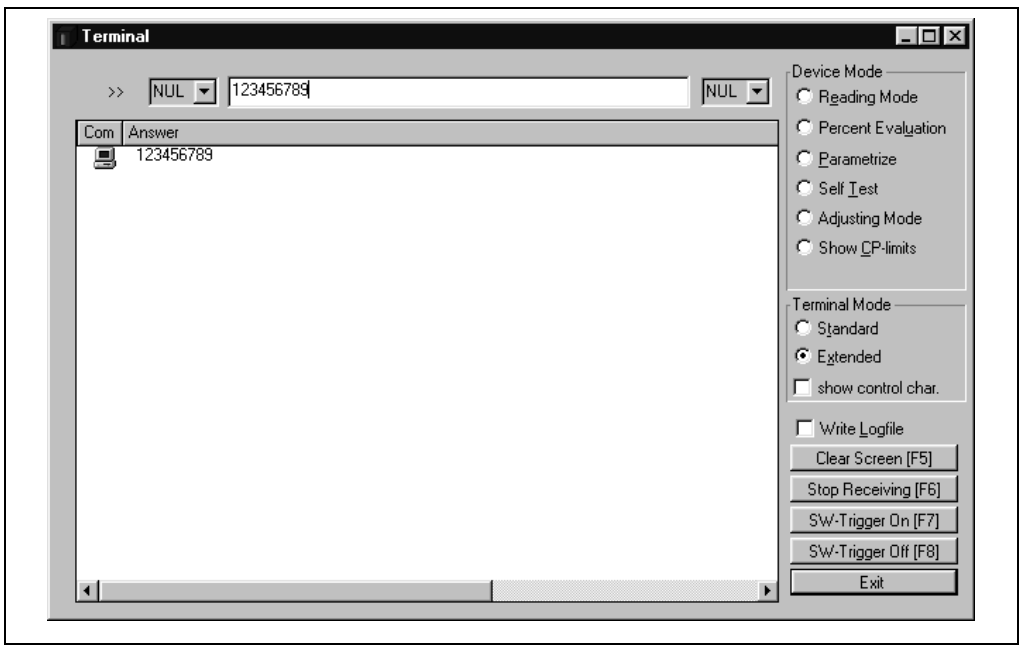

Fig. 10-58: CLV-Setup: auxiliary input on the Terminal Emulator

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Entering a bar code using a terminal/PC keyboard

1. Connect the terminal /PC with Terminal Emulation program to the terminal interface on the CLV (via AMV/S 60). *For the pin assignment, see Chapter 5.5.5 Connecting the CAN interface, Page 5-15.*
2. Set the communication parameters and data output format as shown in *Table 10-9*.

Parameter	Value
Data transmission rate	9 600 bit/s
Data bits	8
Parity	None
Stop bits	1
Data output format	Data terminator *e. g. 1234* *CR*

Table 10-9: Communication parameters on the terminal/PC for the auxiliary input

3. Enter the data content of the bar code on the keyboard.
   The terminal sends the individual characters to the CLV immediately.
   Use the backspace key to correct input errors.
4. Terminate the data content with the control character <CR>.
   The CLV then interprets all further characters as a new data string and ignores other control characters. The data content itself must not contain any control characters.
5. Once the active reading pulse has ended, the CLV sends the data received from the PC to the host via the host interface.

Entering bar codes using a handheld scanner with decoder

1. Connect the handheld scanner with decoder to the terminal interface of the CLV (via AMV/S 60). *For the pin assignment,* see *Chapter 5.5.5 Connecting the CAN interface, Page 5-15.*
2. Set the data format and communication parameters on the handheld scanner as shown in *Table 10-9*.
3. Read the bar code with the handheld scanner.
   Once the active reading pulse has ended, the CLV sends the data received from the PC to the host via the host interface.

If you are using the ST 1100 decoder from SICK, for example, set the communication parameters and data output as shown in *Table 10-10*.

Parameter	Value
Terminal ID	Unassigned
WA Network	No
ACK/NAK	No
Baud rate	9 600 bit/s
Data bits	7
Parity	Space
Configuration	RS 232
Preamble (Header)	Clear
Postamble (Terminator)	CR

Table 10-10: Communication parameter settings for the ST 1100 decoder

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10.11.2 Daisy-chain configuration (data forwarding or master/slave arrangement)

See Technical Information "*Master/Slave with Bar Code Scanners from the CLV Series*" (no. 8 007 675).

10.11.3 SICK network (RS 485)

See Technical Description "*CLX 200 Network Controller*" (no. 8 007 157, German/English edition).

10.11.4 Connection to Profibus DP

See Operating Instructions "*BMV/BMH 10 for Profibus DP*" (no. 8 008 825).

10.11.5 Connection to the DeviceNet

See Operating Instructions "*BMV/BMH 10 for DeviceNet*" (no. 8 008 972).

10.11.6 Connection to Interbus-S

See Technical Information "*BMS 10/20 for Interbus-S*" (no. 8 007 546).

10.11.7 Connection to Ethernet

See Operating Instructions "*BMV/BMH 10 for Ethernet*" (no. 8 009 398).

10.11.8 Building a CAN scanner network

See Operating Instructions "*Application of the CAN interface*" (no. 8 009 180).

10.11.9 Integration in an OPS reading system

See Operating Instructions "*Omni Tracking System OTS 400*" (no. 8 008 869).

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10.12 Replacing a CLV (copying the parameter set)

There are two methods of replacing a CLV and transferring the current parameter set to the new device:

- By downloading the parameters from CLV-Setup
- By importing the parameter set from the external memory

The parameter set can only be transferred between identical device types.

10.12.1 Downloading the parameter set

To download the parameter set, you must connect a PC running the "CLV-Setup" software to the replacement device. The parameter set of the CLV that is to be replaced must be available as a configuration file in CLV-Setup, otherwise the device must be parameterized from scratch.

1. Disconnect the power supply to the AMV/S 60 Connection Module (of the CLV).
2. Disconnect all cable connectors from the CLV.
3. Remove the CLV from the bracket.
   Before doing so, mark the position and alignment on the bracket/station.
4. Mount, align, and connect the replacement device.
5. Connect the PC to the terminal interface on the CLV using an RS 232 data connection cable (AMV/S 60: connect the PC to the internal, 9-pin "Service" plug).
   See Chapter 5.5.5 Connecting the CAN interface, Page 5-15.
6. Switch on the power supply to the AMV/S 60.
   Once the CLV has started, the "Device Ready" LED lights up.
7. Switch on your PC and start Windows.
8. Start CLV-Setup.
   If the communication parameters on the PC and CLV are identical, CLV-Setup uploads the parameter set from the CLV and displays the values on the tabs.
9. Open the archived parameter set as a configuration file "*.scl" in CLV-Setup and download it to the CLV.
10. Confirm the dialog box by choosing the TEMPORARY storage option.
11. Check whether the CLV reads the bar codes correctly.
    Correct the parameter settings if necessary.
12. Finally, download the tested parameter set to the CLV and save it with the PERMANENT storage option.
    The parameter set is transferred permanently to the replacement device.
13. Save the modified parameter set as a new configuration file in CLV-Setup.

Troubleshooting

If the software version on the replacement device is older than the version on the old device (e. g. new device is from warehouse stock), the parameter set transferred may contain coded parameters or parameter values that cannot be interpreted by the older software. The new device, however, outputs an error message in CLV-Setup for each of these parameters/values when the parameter set is downloaded.

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➢ Check whether all of the parameter settings used are necessary to configure the CLV for the current reading application. If necessary, replace the software version in the new device.

If the software version on the new device is more recent than that on the old one, the default settings in the imported parameter set will include parameters that were not contained in the old version.

➢ Upload the parameter set and check whether the new parameters are relevant for configuring the CLV for the current reading application. If necessary, change the parameter values and download the parameter set to the CLV again. Save the new parameter set as a configuration file in CLV-Setup.

See also *Chapter 10.6.8 Unknown parameters, Page 10-47*.

10.12.2 Importing the parameter set from the external memory

A PC does not have to be connected to import the parameter set from the external memory. The parameter set in the external memory must contain an up-to-date copy of the set used by the CLV that is to be replaced. Otherwise, the replacement device will import a different parameter set to its RAM when it is started. The start option in the device must be set to START WITH EXTERNAL PARAMETERS. This is the default setting.

1. Switch off the power supply to the AMV/S 60 Connection Module (of the CLV).
2. Remove the connector cover (containing the parameter memory) from the CLV.
3. Remove the CLV from the bracket.
   Mark the position and alignment of the CLV on the bracket station.
4. Mount the connector cover on the terminals correctly and screw it into place.
5. Mount and align the replacement device.
6. Switch on the power supply to the AMV/S 60.
   The CLV starts and loads the parameter set from the external memory to the RAM.
   The "Device Ready" LED blinks for approx. 10 s and then lights up constantly.

The parameter set is transferred temporarily to the replacement device. It is lost when the device is switched off but is loaded again from the external memory the next time the CLV starts.

See also *Chapter 10.3.8 Replacing a CLV, Page 10-37*.

Troubleshooting

If the software version on the replacement device is older than that of the parameter set in the external memory (e. g. if the replacement device originated from the warehouse), the loaded parameter set may contain parameters or parameter values that cannot be interpreted by the older software. In this case, the "Device Ready" and "Read Result" LEDs blink together for approx. 10 s, after which the "Device Ready" LED lights up constantly. See also *Chapter 10.6.8 Unknown parameters, Page 10-47*.

If the software on the replacement device is newer than that of the parameter set in the external memory, the parameter set loaded from the external parameter memory to the replacement device will contain new parameters that are set to the default values.

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10.13 Accessories

10.13.1 Mounting accessories

Order No.	Description	Figure
2 016 110	Quick clamping device, complete with securing material	*Fig. 10-61*
2 013 824	Angle bracket, single, with 2 screws M 6 x 10 mm, self-locking	*Fig. 10-59*
2 018 435	Articulated bracket (two angle brackets 2 013 824), with 2 screws M 6 x 10 mm, self-locking	*Fig. 10-60*

Table 10-11: Accessories: mounting accessories

10.13.2 Connection modules

Order No.	Type	Description
1 017 134	AMV 60-011	Connection Module for one CLV 490 without heater, with 1 x 15-pin D Sub HD device socket/plug, terminal strips (signal distributor) for connecting the data and function interfaces, internal 9-pin D Sub "Service" plug, strain-relief clamps, polycarbonate housing, enclosure rating IP 30 (max. IP 54), operating voltage 18 ... 30 V DC
1 017 139	AMS 60-013	As AMV 60-011, with integrated power pack: 230 V AC 50 Hz/24V DC
1 017 140	AMS 60-012	As AMV 60-011, with integrated power pack: 115 V AC 50/60 Hz/24V DC
1 017 387	AMS 60-023	As AMS 60-013, with 2-row LCD
1 017 391	AMV 30-071	Connection Module with two CLV 490 without heater, with 2 x 15-pin D Sub HD device socket/plug, terminal strips (signal distributor) for connecting the data and function interfaces, two 9-pin D Sub "Service" plugs, strain-relief clamps, polycarbonate housing, enclosure rating IP 30 (max. IP 54), operating voltage 18 ... 30 V DC
1 019 592	AMV 71-081	Connection module for CLV 490 without heater, with 1 x 15-pin D Sub HD device socket/plug, spring terminal strips (signal distributors) for connecting the data and function interfaces, internal 9-pin D-Sub "Service" plug, plastic cable glands, polycarbonate housing, enclosure rating max. IP 30. With address function for network operation, operating voltage 10 ... 30 V DC
6 021 105	AMV 100-011	Universal Connection Module for one CLV 490 with/without heater, with 1 x 15-pin D Sub HD device socket/plug, terminal strips (signal distributor) for connecting the data and function interfaces, internal 9-pin D Sub "Service" plug, strain-relief clamps, cast aluminum housing, enclosure rating IP 54 (max. IP 65 with connector cover), operating voltage 18 ... 30 V DC
6 021 106	AMV 200-011	As AMV 100, but for two CLV 490s with/without heater
6 007 655	–	Power cable, 3-wire, length 2 m, with 3-pin connector (grounding) and one open end (stripped)

Table 10-12: Accessories: connection modules

10.13.3 Bus connection modules

Order No.	Type	Description
6 020 896	BMV 10-0111	Bus Connection Module for connecting one CLV 490 with/without heater to a **Profibus DP**, with 1 x 15-pin D Sub HD device socket/plug. With 9-pin D Sub bus socket, terminal strips (signal distributor) for connecting the RS 232 and function interfaces, internal 9-pin D Sub "Service" plug, strain-relief clamps, cast aluminum housing, enclosure rating IP 54 (max. IP 65 with connector cover), operating voltage 20 ... 30 V DC
6 020 893	BMH 10-0111	Bus module for connection of one CLV 490 to **Profibus DP**; with terminal screws, a 9-pin D-sub bus socket, no housing, for top-hat-rail installation, enclosure rating max. IP 20, operating voltage 10 to 30 V DC
6 021 190	BMV 10-0311	Bus connection module for connection of one CLV 490 to **DeviceNet**, terminal strips for bus connection, otherwise, as BMV 10-0111

Table 10-13: Accessories: bus connection modules

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Order No.	Type	Description
6 021 188	BMH 10-0111	Bus module for connection of one CLV 490 to **DeviceNet**, otherwise as BMH 10-0111
1 012 683	BMS 20-0113	Bus Connection Module for connection of one CLV 490 without heater to an **Interbus-S**, with 1 x 15-pin D Sub HD device socket/plug, two 9-pin D Sub bus connections (in/out), terminal strips (signal distributor) for connecting the data and function interfaces, internal 9-pin D Sub "Service" plug, integrated power pack 230 V AC 50 Hz/ 24 V DC, strain-relief clamps, enclosure rating IP 30 (max. IP 54)
1 012 684	BMS 20-0112	As BMS 20-0113, with integrated power pack 115 V AC 50/60 Hz/ 24 V DC
6 025 757	BMV 10-0411	Bus connection module for the connection of one CLV 490 with/without heater to **Ethernet**. TCP/IP communication, data transmission rate 10 MBit/s. For the CLV 490 with 1x 15-pin D Sub HD device socket/plug. With a 8-pin RJ-45 bus socket, terminal strips (signal distributors) for wiring the RS 232 data interface and the functional interfaces, internal 9-pin D Sub "Service" plug, cable grips, die-cast aluminum housing, enclosure rating max. IP 54 (enclosure rating max. IP 65 with connector cover), operating voltage 20 to 30 V DC
6 025 756	BMH 10-0411	Bus module for connection of one CLV 490 to **Ethernet.** TCP/IP communication, data transmission rate 10 MBit/s. With terminal screws, a 8-pin RJ-45 bus socket, no housing, for top-hat-rail installation, enclosure rating max. IP 20, operating voltage 10 to 30 V DC
6 022 140	BMV 10-0431	as BMV 10-0411, but with FTP communication, data transmission rate 10/100 MBit/s
6 025 748	BMH 10-0431	as BMH 10-0411, but with FTP communication, data transmission rate 10/100 MBit/s
6 007 655	–	Power cable, 3-wire, length 2 m, with 3-pin connector (grounding) and one open end (stripped)

Table 10-13: Accessories: bus connection modules

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10.13.4 Cables, external parameter memories and plug cover

a) CLV without heater

Temperature range of connection material:

Stationary: –30 ... +70 °C; moving: 0 ... +70 °C

Order No.	Description	Wires	Length	Connection
2 020 302	Connection cable for data interfaces ("Host/Term") or function interfaces ("I/O"), ∅ 8 mm, shielded, with 15-pin D Sub HD socket and 15-pin D Sub HD plug. Required: 2 per CLV	15	3 m	CLV 490 to AMV/S 60 AMV 30-071 BMV 10/BMS 20
2 020 303	Connection cable for data interfaces ("Host/Term"), ∅ 8 mm, shielded, with 15-pin D Sub HD socket and one open end (stripped). Required: 1 per CLV	15	3 m	CLV 490 to Host
2 020 264	Connection cable for function interfaces and power supply ("I/O"), ∅ 8 mm, shielded, with 15-pin D Sub HD plug and one open end (stripped). Required: 1 per CLV	15	3 m	CLV 490 to sensors PLC and non-SICK Power pack
2 020 307	**Connector cover with parameter memory** (EEPROM), enclosure rating IP 65, with two connection cables,each ∅ 8 mm, shielded, with 15-pin D Sub HD socket and 15-pin D Sub HD plug. Required: 1 per CLV	each 15 x 0.14 mm^2	3 m	CLV 490 to AMV/S 60 AMV 30-071 BMV 10
2 020 981	**Connector cover with parameter memory** (EEPROM), enclosure rating IP 65, with two connection cables, each ∅ 8 mm, shielded, two open ends (stripped). Required: 1 per CLV	each 15 x 0.14 mm^2	3 m	CLV 490 to host, sensors, PLC and non-SICK Power pack
2 020 308	**Connector cover with parameter memory** (EEPROM), enclosure rating IP 65, with two connection cables ∅ 8 mm each, shielded, with 9-pin D Sub HD plug and one open end (stripped). Required: 1 per CLV	each 10 x 0.2 mm^2	3 mm	CLV 490 to BMS 20
2 014 054	RS 232 data cable, ∅ 5 mm, shielded, with two 9-pin D Sub sockets (Pin2 (RxD) and Pin 3 (TxD) crossed)	3	3 m	PC to AMV/S BMV 10/BMS 20
6 010 088	Data cable, ∅ 6.6 mm, shielded, for connection cables up to 3 m	15 x 0.09 mm^2	Meter ware	Free wiring
6 007 508	Data cable, ∅ 8.5 mm, twisted pair, shielded	2 x 2 x 0.23 mm^2	Meter ware	SICK network (RS 485)

Table 10-14: Accessories: cables and connector covers for the CLV without heater

Note Other cable lengths/types for CLV without heater available on request.

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b) CLV with heater

Temperature range of connection material:

Stationary: –50 ... +70 °C; moving: –40 ... +70 °C

Order No.	Description	Wires	Length	Connection
2 021 689	**Connector cover with with parameter memory** (EEPROM), enclosure rating IP 65, with 2 connection cables, each ∅ 8 mm, shielded, with 15-pin D Sub HD socket and 15-pin D Sub HD plug Required: 1 per CLV	each 15 x 0.14 mm^2	3 m	CLV 490 to AMV 100/200
2 021 298	2 x connector cover, enclosure rating IP 65, with 2 connection cables, each ∅ 6.7 mm, shielded. Required: 1 per CLV	each 13 x 0.14 mm^2 + 2 x 0.75 mm^2	3 m	CLV 490 to AMV 100/200
2 021 267	Connector cover, enclosure rating IP 65, with 2 connection cables, each ∅ 6.7 mm, shielded, two open ends (stripped). Required: 1 per CLV	1 x 18 x 0.14 mm^2 + 1 x 2 x 0.75 mm^2	3 m	CLV 490 to Host, sensors, PLC and non-Sick Power pack

Table 10-15: Accessories: cables and connector covers for the CLV with heater

Note Other cable lengths/types for CLVs with heater available on request.

10.13.5 Plug-in connections

Order No.	Description
6 009 438	D Sub connector housing (metal) for 9-pin or 15-pin HD inserts
6 007 335	D Sub connector insert, 9-pin socket connector
6 010 019	D Sub connector insert, 15-pin HD socket connector
6 010 020	D Sub connector insert, 15-pin HD pin connector

Table 10-16: Accessories: plug-in connections

10.13.6 Reading pulse generators

The SICK catalog "*SENSICK Sensors for Automation*" (no. 8 006 530) contains a large selection of photoelectric switches and photoelectric proximity switches as well as the associated accessories (brackets, connection cables)

10.13.7 Network controller

Order No.	Type	Description
On request	CLX 200	Network controller with LCD, touch-sensitive keypad, integrated power pack and 9-pin D-Sub connections for network, host and terminal, enclosure rating IP 31

Table 10-17: Accessories: network controller

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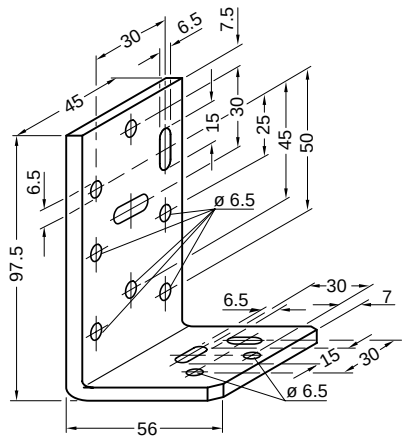
10.14 Dimensioned drawings of the accessories

10.14.1 Angle bracket, single no. 2 013 824



Enclosed to securing the CLV:
2 x cylinder head screws M 6 x 10 mm, self-locking

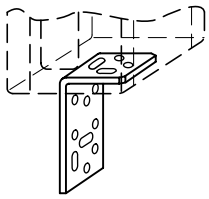
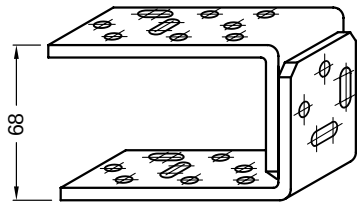
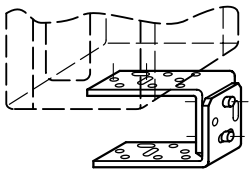


Fig. 10-59: Dimensions of the angle bracket, single No. 2 013 824

10.14.2 Articulated bracket No. 2 018 435

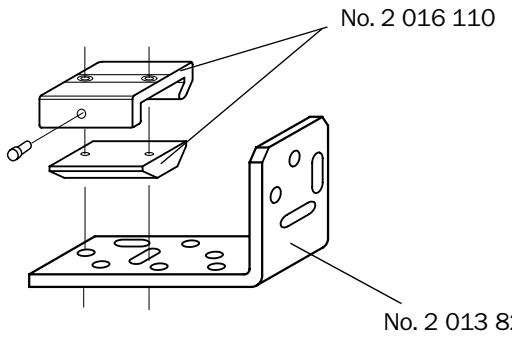


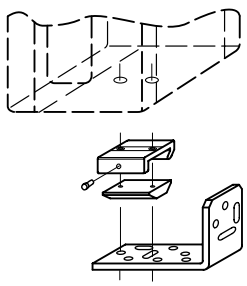


Enclosed to securing the CLV:
2 x cylinder head screws M 6 x 10 mm, self-locking

Fig. 10-60: Dimensions of the articulated bracket No. 2 018 435

10.14.3 Quick clamping device No. 2 016 110





Enclosed parts:
- 2 x hexagon socket head screws M 6 x 16 mm
- 2 x flat-head screws M 6 x 12 mm
- 2 x washer A 6.4
- 1 x threaded pin M 8 x 16 mm

Fig. 10-61: Front view of quick clamping device No. 2 016 110 with angle braket No. 2 0130824

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10.15 Supplementary documentation

Order No.	Title	Contents
2 021 445	Technical Documentation Set	– CLV 490 Operating Instructions in German and English – 1 CD-ROM with the CLV-Setup/CLV-Setup Help/I-ViewPro™ browser software
8 008 296	"AMV/S 60" Operating Instructions	Description for connecting the CLV without heater to the host/PLC/sensor via the AMV/S 60 Connection Module
8 008 648	"AMV 30-071" Operating Instructions	Description for installing two CLVs without heaters to the host/PLC/sensor via the AMV 30-071 connection module
8 009 154	Operating Instructions "AMV 70/71"	Description for wiring the CLV to the SICK-Netzwerk/PLC/sensor via the AMV/S 71 connection module
8 008 879	"AMV 100/200" Operating Instructions	Description for connecting 1 (2) CLV without/with heater to the host/PLC/sensor via the AMV 100 (AMV 200) Connection Module
8 007 675	"Master/Slave with CLV Bar Code Scanners" Technical Information	Description of building a daisy-chain configuration (master/slave or data forwarding)
8 007 157	"CLX 200 Network Controller" Technical Description	Description of building a SICK Network (RS 485) with CLV bar code scanners
8 008 825	"BMV/BMH 10 for Profibus DP" Operating Instructions	Description for connecting the CLV to the Profibus/PLC/sensor via the BMV/BMH 10 Bus Connection Module
8 008 972	"BMV/BMH 10 for DeviceNet" Operating Instructions	Description for connecting the CLV to the DeviceNet/PLC/sensor via the BMV/BMH 10 bus connection module
8 007 546	"BMS 10/20 for Interbus-S" Technical Information	Description for connecting the CLV to the Interbus/SPS/sensor via the BMS 20 Bus Connection Module
8 009 398	"BMV/BMH 10 for Ethernet" operating instructions	Description of the connection of the CLV to the Ethernet/the PLC/the sensor via the bus connection module BMV/bus module BMH 10
8 008 869	"Omni Tracking System OTS 400" Operating Instructions	Description of the integration of the CLV 490 in an omnidirectional OPS reading system
8 009 180	"Application of the CAN Interface" Operating Instructions	Description for building a CAN network (electrical connection, configuration of the CLV, functions)
On request	Command strings	Description of the command strings for the CLV functions

Table 10-18: Supplementary documentation in English language

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10.16 Glossary

For further terms, please refer to the "*CLV-Setup Help*".

Adjusting mode

Special operating mode that enables the center of the scan line to be positioned exactly on the object containing the bar code.

Aperture angle α

Angle within whose limits the laser beam is deflected by the polygon mirror wheel. A V-shaped range perpendicular to the scan direction, which must contain the bar code, is formed in front of the reading window. If only part of this aperture angle is used (part of the scan line symmetric around the center point), the depth of field for the focus position and resolution is greater.

Aspect ratio

Ratio code height (bar length) to code length (numer of characters) Using the SMART Decoder even bar codes with very small code height can be read.

Autofocus function

Ability of the CLV to detect the distance of the objects during the reading operation without external sensors in order to adapt the focus position to the reading plane of the bar codes.

Auxiliary input

Special function on ⇨ the terminal interface. Used to enter bar code data subsequently in order to complete reading results sent to the host.

Capture range

Zone around a moving bar code created by the CLV using the increment management and code position comparison functions. Enables bar codes with identical contents and code type to be separated.

Christmas tree effect

Effect caused by limiting the active scan line range (CP values) and oscillating amplitude (CW values) on the ⇨ line scanner with oscillating mirror. In this way, a uniform sharply defined window can be created in the reading field for each distance configuration, independent of the reading distance.

CLV-Setup

PC program that runs on Windows 95™/98 ™ and Windows NT™ and is used to parameterize the CLV offline (adjust the device to the local conditions) and operate it online. The parameter set is exchanged with the CLV by ⇨ uploading and ⇨ downloading it.

CLV-Setup Help

Online help function that provides support for using the "CLV-Setup" program. The help function explains the CLV parameters and their permissible values and can be launched directly from CLV-Setup in an HTML browser, such as Netscape Navigator™ , or I-ViewPro™ supplied with the program.

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Code angle (CW value)

Current deflection range of he scan line (oscillating mirror) perpendicular to the scan direction when a bar code is recorded. Calculated by the CLV for each scan and used, for example, to define a capture range so that bar codes with identical data contents in a given range can be separated.

Code geometry

Length and height dimensions of the bar code.

Code position (CP value)

Position of the first dark bar in a detected bar code along the ⇨ scan line. Calculated by the CLV for each scan and can be used, for example, to separate bar codes with identical data contents. The active evaluation range in the scan line can be restricted for ⇨ decoding purposes by specifying the maximum and minimum CP value for the application.

Command strings, commands

CLV user interface – alternative to the "CLV-Setup" program. Basic, yet clearly structured command language for modifying the CLV parameter sets online. Accesses the CLV command interpreter directly. Special programming activities are required to use the command strings from the host.

Configuration file

File in the "CLV-Setup" program that archives the entire ⇨ parameter set of the CLV. Can also be printed out in tabular form.

Data forwarding

Option of forwarding data sent by the host transparently to a terminal via the CLV using an identifier. Data can also be forwarded in the opposite direction. Furthermore, this function also allows data received on one of the serial interfaces to be output again straight away on one of the same interfaces (echo). Application: forwarding reading results in pass-through mode, e. g. in a master/slave network.

Data output string

Structured data telegram in the ⇨ reading result output by the CLV on the ⇨ host interface. The structure of the data string is flexible and can be adapted to a large extent to the subsequent data processing task. The data output format of the ⇨ terminal interface, on the other hand, cannot be changed.

Decoder, decoding

Code-type-specific evaluation routine for reconstructing the read bar code in electronic form in order to decode its data content.

Deflection angle

Angle about each side of the center position CW = 50 (equal to 0) that the ⇨ scan line sweeps when it is deflected by the oscillating mirror. Also referred to as the oscillating angle.

Deflection range

Deflection of the scan line caused by the ⇨ oscillating mirror, perpendicular to the scan direction about the center position CW = 50 at each side (corresponds to a deflection angle of 105). Also referred to as oscillating amplitude. The maximum deflection range is set in

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OSCILLATING WITH FIXED AMPLITUDE mode. In OSCILLATING WITH VARIABLE AMPLITUDE mode, the deflection range is set for each distance configuration using the OSCILLATING MIRROR tab in the "CLV-Setup" program.

Distance configuration

Data record in the CLV for defining a ⇨ focus position for the laser beam for ⇨ dynamic focus control. The focus position as well as the maximum and minimum ⇨ code position must be entered on the READING CONFIGURATION tab in the "CLV-Setup" program for this purpose. In the case of the line scanner with oscillating mirror, the ⇨ oscillating amplitude (deflection range) is also required. The depths of field for the individual focus positions are shown as a function of the resolution values in the specification diagrams.

Distance detector

System for recording the distance of objects with a bar code in front of the CLV in stages. When the bar code is read from above, for example, the distance is detected by installing photoelectric reflex switches above one another beside the conveyor belt. Together with the combination of "IN 0" to "IN 4" switching inputs and the assignment table for the ⇨ distance configurations, the ranges for ⇨ dynamic focus control are defined. Only required if the ⇨ Autofocus function is not used.

Distance profile

When using the ⇨ Autofocus function with differential background (with or without tracking), the CLV can teach-in the ambient background (without objects) to narrow its active reading range. The CLV creates a profile of the various distances in its reading field along the scan lines in a special mode. This profile is then used to detect objects in the reading field and to set the required focus position at the level of the bar code on the object.

Download

Method of transferring the ⇨ parameter set that was modified with the ⇨ "CLV-Setup" program offline from the PC to the RAM of the CLV. CLV-Setup transfers either a complete copy of the CLV (DOWNLOAD TO CLV) to the memory (RAM) or just the edited parameters using the right mouse button's context menus (DOWNLOAD PARAMETER). You can overwrite the existing parameter set in EEPROM of the CLV by choosing the PERMANENT storage option.

Dynamic focus control

Function for shifting the focal point of the laser beam across a wide range in the reading plane. The dynamic focus control function is event controlled (e. g. by the distance detector) or dynamic in the ⇨ Autofocus function.

Error messages

Messages in ⇨ plain text that are used to identify a malfunction on the CLV in Reading mode. The messages are output on the terminal interface only. Exception: ST = 3 (device error), which is also output on the host interface. The error messages can be displayed in extended mode under TERMINAL EMULATOR in the "CLV-Setup" program.

Error status

Identifier output with the reading result by the CLV for errors that were diagnosed while the bar code was being read. The entry for the host interface is made in the separator of the ⇨ data output string and must be enabled using the parameters (enabled by default).

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Focus position

Distance of the focal point of the emitted laser beam in front of the reading window. Can be varied using the optical components in the CLV. Creates a distance-specific depth of field (DOF) in which he bar code can be detected.

Functional interfaces

Switching inputs and outputs on the CLV.

Good Read

The CLV successfully detected a bar code or the required number of bar codes specified by the evaluation parameters during the ⇨ reading pulse.

Header

Data block in the reading result on the ⇨ host interface. Used as a header in the ⇨ data output string for the subsequent data content of the bar code. Contains reading diagnosis data and/or constants (e. g. letters), depending on the configuration (empty by default).

Host interface

Main data interface on the CLV with configurable data output format. Used to output the ⇨ reading result in telegram form to the host/PLC. Integrates the CLV in the SICK network or builds a master/slave arrangement. Physically switchable to RS 232 or RS 422/485. It supports various transmission protocols.

Increment management

Used in certain applications to separate bar codes with identical contents that move during the reading procedure and assign them to the objects.

Line scanner

Scanner that uses a polygon mirror wheel with paraxial mirrors to deflect a focused laser beam extremely fast. As a result, it creates a light spot in the reading plane that moves along a straight line, which appears to the naked eye as a stationary scan line.

Line scanner with oscillating mirror

Line scanner that also deflects the laser beam about a central position, on both sides and perpendicular to the scan direction using an oscillating mirror. By doing so, the CLV can search for bar codes in larger areas. In addition to basic deflection with the maximum oscillating amplitude, optimum oscillating mirror functions are also possible (variable deflection per distance configuration, ⇨ One-Shot).

Master/slave configuration

Special arrangement for connecting up to max. 10 SICK bar code scanners in the CAN scanner network to one reading station (e. g. left/right read). Thanks to the master, the entire network appears as one device to the host.

Multiple read

Variable number of reading operations that must provide identical reading results (data content) of the same bar code before the CLV outputs the result.

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No Read

The CLV failed to detect a bar code or the required number of bar codes specified by the evaluation parameters during the ⇨ reading pulse.

No Read format

Special, parameterizable data block as a substitute for bar codes, which were expected but not detected, in the data output string on the host interface for ⇨ No Read. Comprises a variable combination of the error string and the ⇨ separator.

Object height detector

See distance detector.

One-Shot

Selective, one-off deflection of the oscillating mirror for each ⇨ reading pulse. Usually comprises a slow forward phase (read) and a fast return phase (return to starting position).

Oscillating mirror reversal point

Deflection point of the oscillating mirror at which it changes direction. Can be used to trigger a ⇨ focus position switchover for slower applications (search mode).

Parameter set

Data record used to initialize and activate the functions implemented in the CLV. With ⇨ downloading and ⇨ uploading the parameter set is transferred form CLV-Setup to the CLV or from the CLV to CLV-Setup.

Parameter memory, external

Optional accessory containing an integrated connector cover. Enables devices to be conveniently replaced by storing a copy of the CLV parameter set (EEPROM). The replacement device then accesses this parameter set directly and does not have to be configured manually.

Percentage evaluation

Special operating mode in which the quality of the reads (not those of the bar codes, however) is assessed statistically. The bar codes must be stationary. The CLV carries out 100 scans and evaluates the reading quality. It then outputs the reading results on the ⇨ terminal interface every 2 s together with the ⇨ reading diagnosis data.

Plain text

Legible form of a CLV message. The CLV outputs special messages in coded form, e. g. the result of the self-test is represented as three digits.

Reading diagnosis data

Data directly derived from the reading procedure by the CLV. This data enables the quality of the read to be assessed. The data is always output on the ⇨ terminal interface together with the reading result. Only output on the host interface if enabled on the DATA STRING tab in the "CLV-Setup" program. The error status ST is output in the separator by default.

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Reading field height

Length of the ⇨ scan line that is available for detecting the bar code in the reading plane. Due to the V-principle of beam generation, the reading field height is dependent on the reading distance.

Reading interval

Timeslot in which the CLV activates the laser diode and attempts to detect valid bar codes from the information read. The reading interval may be shorter than the external reading pulse, depending on the selected output mode for the reading result.

Reading pulse

Clock pulse applied externally to the CLV to trigger the internal ⇨ reading interval. Can be supplied by a photoelectric reflex switch or a command from the host on the serial interface.

Reading range (DOF)

Depth of field about the focal point of the laser beam on two sides. The extent of the reading range depends on the resolution and reading distance.

Reading result

Electronic representation of the data content of the read bar code together with the ⇨ reading diagnosis data in one ⇨ data output string that is generated after the reading pulse has elapsed. The reading result on the terminal interface has a fixed format (content and output format); the reading result on the host interface can be configured separately for Good Reads and No Reads. Special characters can also be added if necessary.

Result status output

Function of the four "Result 1" ... "Result 4" switching outputs in Reading mode. Signals the status of the reading result without indicating its contents (e. g. Good Read). You can assign a status to each output on the DEVICE FUNCTION tab in CLV. The "Read Result" LED is linked to the "Result 2" output.

Scan line

See line scanner.

Sending point

Point at which the reading result is output with respect to the start of the ⇨ reading pulse and the internal ⇨ reading interval.

Separator

Data block in the reading result on the ⇨ host interface. Used to separate the data content of the bar codes. Can be attached to the bar code as a prefix or suffix. Contains reading diagnosis data and/or constants (e. g. letters), depending on the configuration. The error status ST is output in the seperator by default.

SICK network

Special, high performance network of max. 31 CLVs with high data transfer rates on the RS 485 interface. The CLVs are coordinated (polling) and connected to the host via the CLX 200 Network Controller.

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SMART decoder

Specially developed ⇨ decoder for reading bar codes with an extremely small code height and for poor-quality or contaminated code prints.

Specification diagrams

Diagrams for reading the resolution-specific depth of field (DOF) for specific focus positions.

Standard decoder

Tried-and-tested ⇨ decoder from the CLV product family. Suitable for applications with an adequate code height, limited tilt, and high-quality code prints.

Storage in the CLV

The application-specific ⇨ parameter set can be stored temporarily or permanently in the CLV. If it is stored temporarily in the RAM, it is lost as soon as the power supply is switched off. Parameter sets that are stored permanently are transferred to the EEPROM in the CLV and remain active as the current data record when the power supply is switched off. The default setting is not affected by this and is stored in a read-only memory (ROM).

Switching sequence

Focus control function for event-controlled switching. Sequence of focus position settings with associated depths of field. The numbers of the active ⇨ distance configurations are entered at the required position in the assignment table for this purpose.

System messages

Messages ⇨ in plain text used to output the operating status of the CLV. The messages are output on the terminal interface only and can be displayed in extended mode in the TERMINAL EMULATOR of the "CLV-Setup" program.

Teach-in

Method of programming the information required to adjust the CLV to the reading application in Parameterization mode. Example: teaching in the background for the Autofocus function, also known as a ⇨ distance profile.

Terminal interface

Auxiliary data interface (RS 232) on the CLV with fixed data output format. Used to connect the "CLV-Setup" program to the CLV so that it can operate and configure the device. Also used to output system and error messages. Can be assigned various functions.

Terminator

Data block in the reading result on the ⇨ host interface. Used to terminate the data content of the bar code. Contains reading diagnosis data and/or constants (e. g. letters), depending on the configuration. The control characters <CR> and <LF> are output in the terminator by default.

Upload

Method of transferring the ⇨ parameter set from the CLV to the PC using the ⇨ "CLV-Setup" program. CLV-Setup loads either a complete copy of the current parameter set from the CLV's memory (RAM) (UPLOAD TO CLV) or just the recently edited parameter, using the right mouse button's context menus (UPLOAD PARAMETER). Displays the current parameter values on the tabs. Prerequisite for modifying the current parameter set.

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User interface

Windows-based PC software "CLV-Setup" for operating and configuring the CLV.

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10.17 Copy of the EC Declaration of Conformity

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EC Declaration of Conformity

In Compliance with the EC Directive on Electromagnetic Compatibility 89/336/EEC

We hereby declare that the devices (see page 2)

of the product family CLV490

comply with the basic requirements of the EC Directive specified under Point 1. If an item of equip-ment listed overleaf is modified without our approval then this declaration loses its validity for this equipment.

We employ a quality system certified by the DQS (German Quality Assurance Society), No. 19 462-01, as per ISO 9001 and have therefore observed the regulations in accordance with module H as well as the following EC directives and EN standards during development and production:

1. ***EC directives***	EC EMC directive 89/336/EEC as per 92/31/EEC, 93/68/EEC, 93/465/EEC		
2. ***Harmonized standards used***	EN 50081-1	Emitted interference, residential commercial and light industry	Ed. 92-01
	EN 61000-6-2	Immunity, industry	Ed. 99-04

Conformance of a type sample belonging to the above-mentioned product family with the regulations from the listed EC directives has been certified by:

Test authority — The tests were carried out and documented on our own responsibility.

Reute, 1999-08-17

i. V. Piechenkemper
(Manager Development Division Auto Ident)

i. V. Walter
(Manager Production Division Auto Ident)

The declaration certifies conformance with the listed directives, but does not guarantee product characteristics. The safety instructions contained in the product documentation must be observed.

Mat. No.: 9 053 454
Page 3, engl.
Update no.: see page2

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The EC Declaration of Conformity No. 9053454 is valid for the following types of the product family CL.490:

Type	Id.-No.
CLV490-0010	1016958
CLV490-0011	1016960
CLV490-1010	1016959
CLV490-1011	1016961
CLV490-6010	1018872
CLV490-6011	1019095
CLV490-7010	1019094
CLV490-7011	1019096
CLV490-2010	1019311
CLV490-2011	1019312
CLV490-3010	1019313
CLV490-3011	1019314
CLX490-0010	1019318
CLX490-0011	1019319
CLV490-0010S01	1018997
CLV490-0010S02	1019158
CLV490-0010S03	1019211
CLV490-1010S01	1018998
CLV490-1010S02	1019212
CLV490-0011S01	1019389
CLV490-1011S01	1019390
CLV490-2010S01	1019391
CLV490-3011S01	1019392
CLV490-2011S01	1019393
CLV490-3010S01	1019394
CLV490-6010S01	1019395
CLV490-7010S01	1019396
CLV490-6011S01	1019397
CLV490-7011S01	1019398

-end of list-

Mat.-No.: 9 053 454
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10.19 Bar code example

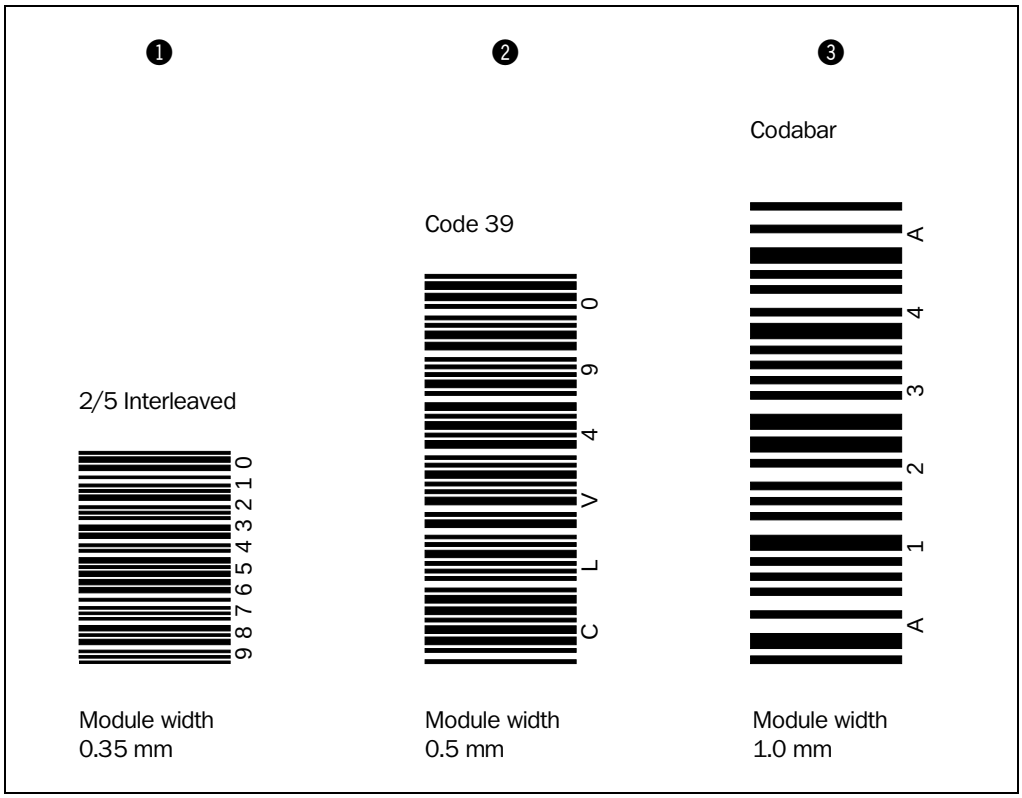

Fig. 10-64: Scannable bar codes with various module widths (print ratio 2:1)

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